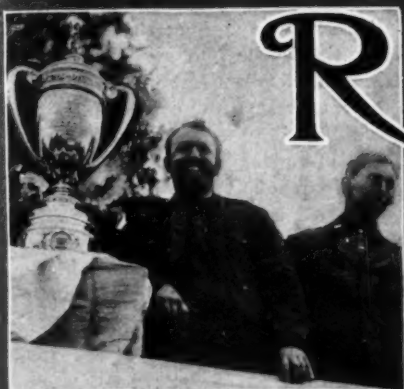


THE AUTOMOBILE



Robertson—Trophy—Smile

ROBERTSON AGAIN WINS FAIRMOUNT RACE

OFFICIAL ORDER OF THE FINISHING QUINTETTE

Pos.	Car	Driver	Time
1	Simplex, 90 h. p.	Robertson	3:38:58-8-10
2	Chalmers-Detroit, 40 h. p.	Dingley	3:44:20
3	Apperson, 50 h. p.	Harding	3:52:17-7-10
4	Chadwick, 60 h. p.	Parkin	3:55:31-2-10
5	Isotta, 40 h. p.	Strang	3:56:54-4-10

PHILADELPHIA, Oct. 9—George Robertson is thoroughly at home in Fairmount Park. To-day, driving a 90-horsepower Simplex, he scored from a representative field in the 200-mile stock chassis race. A year ago, with a 40-horsepower Locomobile, the same intrepid driver appropriated honors which he appreciates with a characteristic modesty that adds to his widespread popularity. Robertson has become the American Nazzaro, and it would be most interesting if he were to meet the cool-headed Italian in a motor-driven battle for the world's championship. Such a race would be worth the watching.

True it is that in to-day's race Robertson had a Simplex speed craft possessed of twice the power of Dingley's Chalmers-Detroit, which finished second, but the fact remains that the pilot of the larger car did his work in a brilliantly capable manner.

Some five minutes behind Dingley came Harding with a well-driven Apperson "Jack Rabbit," while the Chadwick, with the younger and elder Parkin aboard, had a rattling good battle with Strang—once more on an Isotta—for fourth place, the six-cylinder from Pottstown proving the victor.

In addition to the honors which go along with an impressive win under such favorable conditions, Robertson annexed \$2,500 in gold and the \$1,000 MacDonald and Campbell trophy. Dingley captured \$1,250 in gold and a gold chronometer for

the most consistent work. Along with third place Harding gathered in \$750, while the plucky work of "Joe" Parkin against a past master in the art of driving brought him in \$500 in the yellow metal. This youngster was one of the race's surprises.

Robertson's victory is a great personal triumph, inasmuch as the Fairmount Park eight-mile circuit is what might be termed a "driver's course." There are no long straightaways on which a big, powerful car can be opened wide and thus mow down its less powerful competitors. Every car in to-day's race was



90-Horsepower Simplex (Robertson) That Won the Contest Had Speed in Plenty

capable of a mile-a-minute speed or better, but such a clip, if maintained over the sinuosities of the Park roads that composed the course, would soon bring to grief the driver who attempted it. Robertson averaged about 55 miles an hour, but withal nursed his car so carefully that he was compelled to stop but once to remedy minor trouble and once for supplies. The fact that he guided a Locomobile to victory over the same course last year would seem to bear out the claim that it was a Robertson rather than a Simplex victory.

Philadelphia and the Quaker City Motor Club to-day set a mark in big race management which other promoters may aim to approach; they can hardly excel it. Eighteen hundred policemen, 120 flagmen and umpires, a big corps of doctors and nurses with all the paraphernalia of their craft, and miles and miles of rope made for the public safety. The whole problem of course-guarding was directly under the eye of Mayor Reyburn and the Department of Public Safety, with Superintendent of Police Taylor doing the action stunt. That they succeeded in their task was manifest, for the accidents in that mighty crowd, where accidents were to be expected, were few and far between, and even those that did occur were of a minor variety.

The only accident to a racing man came in the 8th lap when American, No. 12, Hayes, driver, was negotiating the combination S-hairpin at Sweet Brier Mansion. The car skidded to the right and then to the left, landing heavily against one of the ubiquitous telephone poles without which no course seems complete. Hayes shut off and held to the wheel, managing to stay with the car when the crash came. Mechanician A. H. Johnson went ahead when the car stopped and landed on his head and shoulders in the grass. He was merely stunned, however, and in a couple of minutes, with the aid of the Red Cross artists who were on the scene in a jiffy, he and Hayes were walking cross-country to the main stand.

Malin Leinau, driving Acme, No. 7, missed serious trouble at the same point by quick work and a little luck. His speed carried him so far to the side of the road that the car mounted the gently shelving bank, and ran on the grass for fifty yards, passing between the scattered trees and reaching the road some distance below. On a later lap the Acme shed a tire at the foot of the same slope, and had to stop directly in the path of the others while the crew fitted another to the wheel.

The Selden, No. 23, broke a wheel on the same S-hairpin on the first lap and lost over half an hour.

The Acme furnished a sensation on the 12th lap, when the right rear tire came off directly in front of the upper end of the long grand stand. The tire flew 30 feet into the air and in its descent struck a small boy who was watching the run from one of the pits in front of the stand. He was merely stunned, but was carried off by one of the official Red Cross cars in a jiffy.

It was a day for the four-cylinder car and one for the light-weight and small-horsepower machine. The "40" Chalmers, runner-up to the "90" Simplex, had scarcely half the latter's piston displacement, and it took a 710-cubic inch Chadwick to beat the 490-cubic inch Isotta by a minute. Both these cars also made wonderful average laps, the Isotta not varying over 29

seconds, while the Chalmers' greatest variation, barring the first two laps, was 50 seconds. Only fourth place was taken by a "six"; first, second, third and fifth went to four-cylinder machines. The following were the four and six-cylinder machines entered:

No.	Four-Cylinder	H.P.	No.	Six-Cylinder	H.P.
2	Simplex	90	2	Thomas	70
2	Chalmers-Detroit	40	2	Chadwick	90
2	American	60	1	Acme	60
2	Buick	30	1	Palmer & Singer	60
1	Benz	60	1	Alco	60
1	Apperson	60	2	Welch	70
1	Columbia	32	1	Lozier	50
1	Isotta	45			
1	Selden	36			

The average speed of the first five cars was higher than that of last year's winner. No. 4 Simplex averaged 55.4 miles per hour; No. 5 Chalmers, 54.2; No. 8 Apperson, 52.2; No. 18 Chadwick, 51.4; No. 17 Isotta, 51.3. The Locomobile last year did 50.1.

Not only were the average speeds very much greater, but the lap speed of some of the cars was nothing short of wonderful, if the timing was correct. (Needless to say, the method used did not impress old timers as very satisfactory.) Zengle in the Chadwick made a lap in 7:41, or at a rate of 63.3 miles per hour, and with it came \$100 in gold. Next came the big Simplex with 62.9 miles per hour. Following these closely came Dingley with a lap at 62.3. The fourth best was Betz with the other Simplex, 61.5.

This is only part of the story, however, for although the first two cars, Nos. 16 and 4, had the largest motors in the race, No. 5 had one of the smallest. The piston displacements were:

No.	Car	Driver	Cu. In.	Finish
16	Chadwick	Zengle	710	Out
4	Simplex	Robertson	672	First
5	Chalmers	Dingley	373	Second
1	Simplex	Betz	672	Out
8	Apperson	Harding	596	Third
18	Chadwick	Parkin	710	Fourth
17	Isotta	Strang	490	Fifth

This shows that the Chalmers, with 55 per cent. the displacement of the Simplex, was able to almost hold its own with the larger car. In addition, because of its smaller motor, it did not have to stop for fuel during the race. Because of its light weight it was not necessary to stop for tires—in fact, Dingley never made a stop during the race. The consistency prize, a gold watch, offered by the Autolight Company, went to this combination of man and machine. Robertson only stopped once, on the fourteenth lap, to replenish his fuel supply and change tires. There was some talk of protesting the Simplex on the ground that it was not stock. Later it was given out that the Chalmers-Detroit had decided not to force the issue.

To Strang and the Isotta should go the credit of making the most consistent run of all the cars. At no time during the race, except when he stopped for fuel on the eighteenth lap, did the Isotta's time vary over 29 seconds. His slowest lap was 9:31; his fastest 9:02. In all races in which Strang has piloted an Isotta car he has made just this consistent running.

The first five cars were equipped with Michelin tires. Robertson and Harding made but one change, and that when they stopped for fuel supplies.

HOW THE RACE WAS FOUGHT BY LAPS

Lap 1—It was evident that there was to be no waiting game played, for all the favorites let their cars out to the limit from the jump—Robertson in the Simplex, Chevrolet in the Buick, Drach in the American, and Zengle in the Chadwick, all doing the lap under 9 minutes—in 8.33, 8.40, 8.44 and 8.50 respectively—with Dingley's Chalmers third and William's Palmer-Singer fifth and sixth respectively. Selden, No. 23, threw a tire at Sweet Brier Hill, less than a mile from the start, and lost 35 minutes. Burman's Buick, No. 9, was not working right, and he finished the lap among the tail-enders. Haupt in the Thomas, No. 6, Leinau in Acme, No. 7, and Harding in the Apperson, No. 8, also had trouble with tires on the initial round, and lost valuable ground. Seymour, on the back stretch, near Neill Drive serpentine, broke his water

pump and dropped out then and there, failing to complete first lap.

Lap 2—Chevrolet jumped his Buick into the lead, with 39 seconds advantage over Robertson, who was sharing third place with Drach in the American, and 32 seconds ahead of Zengle in the Chadwick, who had crawled up into second place. Reports of continued tire trouble came flashing in from Benz, No. 3, Willie Haupt's Chadwick and Leinau's Acme, the trouble occurring in each instance far from the pits, and resulting in additional delay. Dingley was still in fifth place, but by a closer margin, and Parkin has brought his Chadwick up into sixth position, displacing Wallace's Palmer-Singer, which dropped a notch.

Lap 3 saw Chevrolet still in the lead, but by the small margin of three seconds over Robertson, who had an advantage over Drach

of 46 seconds. Zengle dropped back to fourth position, eight seconds behind Drach, with Dingley still fifth and his team-mate, Lorimer, in Chalmers-Detroit, No. 19, coming up rapidly from 9th place to 6th. Strang in Isotta, No. 17, first began to show prominently on this round, coming up from 10th to 7th position, and trailing the Chalmers pair closely. The Quaker brewers, Bergdoll and Betz, in the Thomas and Simplex respectively, were having a battle all to themselves, occupying 8th and 9th positions, and being separated by a margin of but five seconds. The former's brother, Erwin, in the Welch, No. 20, failed to register the third lap, having been reported in trouble with his engine on the Neill Drive; he later retired. Coffey's Columbia, No. 14, also developed a loose rear construction, and also withdrew.

Lap 4—Robertson came back to his own on this round, Chevrolet's engine misbehaving sufficiently long to relegate him to 15th place, while Drach and Dingley moved up into 2d and 3d places respectively, but with a margin of nearly 1½ and 3 minutes separating them from the leader, thanks to "Robby's" record 7.44 in the previous round. Amateur Betz, in Simplex, No. 1, crawled up into 4th place, the local man's effort being greeted with cheers.

kept grinding out laps that averaged around 8.35, a short stop in the 11th round, when Zengle came within 14 seconds of him, being followed on the 13th with a thrilling 7.31, which increased his margin of lead by over a minute. In the unlucky 13th round Zengle also opened 'er up and set the stands rocking with a 7.31 circuit; but he must have pushed matters too strenuously, for it was three-quarters of an hour before he reappeared at the tape, magneto trouble developing and delaying him continuously.

During this period Dingley kept ding-donging along at a most beautifully even pace, without a stop for anything, supplies and tires seeming apparently to be unheard-of things in the Dingley lexicon. The margin of time separating him from the leaders seldom varied more than a minute, and the Chalmers kept on in the "even tenor," etc., in a manner that boded ill for falterers.

The plucky driving of Amateur Betz during this period brought him a big hand every time he sent his big yellow Simplex past the stands. He tore off a 7.54 on the 11th round, just to show what he could do. At the end of the 13th round he was a trifle over 7 minutes behind Robertson, going like an electric fan.

Strang kept his Isotta within striking distance, and if anything



Dingley's 40-Horsepower Chalmers-Detroit Which Finished a Convincing Second

Strang also improved his position, climbing to 5th place, Zengle dropping to 7th and letting Bergdoll, another local favorite, in ahead of him. Engine trouble was reported as the cause of Zengle's slow-down. Parkin, still another Quaker favorite, who had dropped to 11th on the previous round, moved up to 9th place, right behind Hayes in the American Roadster, who had also improved his position from 12th to 8th place. Haupt's Thomas, No. 6, was reported down and out with engine trouble.

Lap 5 saw Robertson still in the lead, but with Zengle, by virtue of a phenomenal round in 7.40, flashing into the place, with but a trifle over a minute separating him from the leader. Dingley was still third, by a similar margin, while Brewer Betz was ousted from his hold on 4th place by Strang, but by the margin of but one brief second. Bergdoll still occupied 6th position, with Drach, who had to stop at the pit, in 7th place as a result of the five-minute lay-over. Chalmers-Detroit, No. 19, was reported at the filter plant with a broken frame, and was later announced as withdrawn. The Parker Chadwick nosed out the American Roadster, No. 12, for 8th position, the latter leading Harding's Apperson by exactly one minute.

Lap 6—There were no changes in the relative positions of the three leaders, although Zengle had gained 24 seconds on Robertson during the round, with Dingley 2.01 behind the Chadwick. Betz regained fourth place from Strang and led him by 33 seconds at the wire, with Bergdoll's Thomas, Drach's American and Parkin's Chadwick retaining their respective positions.

Laps 7 to 13—For seven laps the positions of the leading quintet remained unchanged. With the regularity of clockwork Robertson

happened it was evident that he would have to be reckoned with.

During these seven laps the Parkin Chadwick, Harding's Apperson and the Drach American were having a triangular battle for 6th, 7th and 8th places, the completion of the 13th lap showing them placed in the order named. On the 7th lap Hayes' American, No. 12, was eliminated by a telephone pole into which it skidded on the back stretch, breaking both front wheels and otherwise damaging the car. The following lap witnessed the departure of Leinaw's Acme, after a series of disheartening delays due to engine trouble. The same cause was announced as being responsible for the disappearance of Chevrolet's Buick from the course in the 12th lap.

Laps 14 and 15—With Zengle's troubles in the 14th round came a move up for Dingley and Betz, this pair dropping into 2d and 3d places, about 6 and 8 minutes, respectively, behind Robertson. Parkin jumped ahead of Strang just here, and it was a peculiar coincidence that throughout the race, almost from the start, these two were within striking distance of each other, the margin separating them rarely being much more than a minute, except on those occasions when one or the other stopped for supplies. Both cars ran most consistently. Apperson moved up into 6th place on the 14th round and Wallace, in the Palmer-Singer, who had been going sweetly, swung in back of him on the 15th circuit.

Laps 16, 17 and 18—Nothing now apparently being able to dislodge Robertson and Dingley from their positions except serious trouble of some kind, interest in the race was centered in the struggle for 3d place between Harding, Parkin and Strang. The latter looked good to the crowd when he finished the 16th circuit in

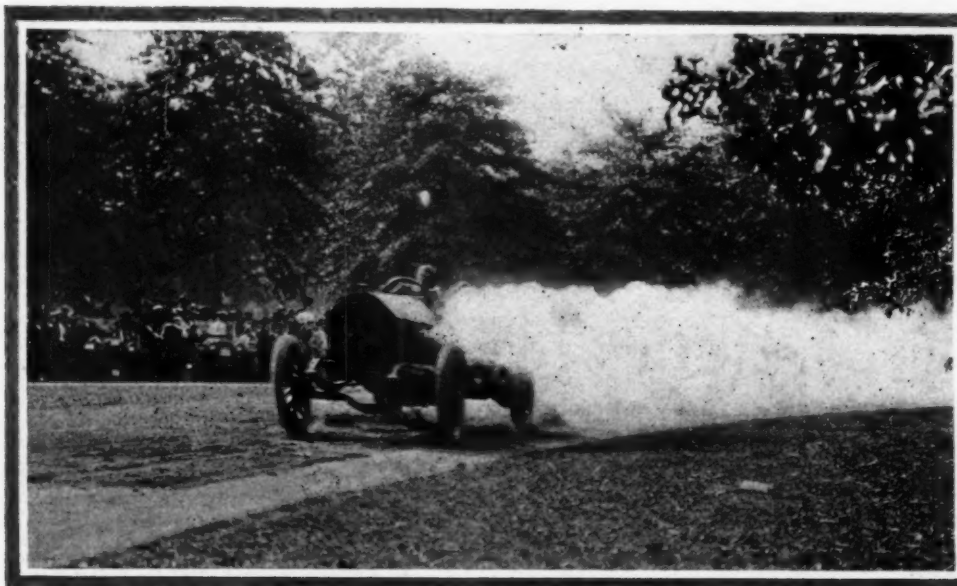
SECOND ANNUAL FAIRMOUNT PARK STOCK CHASSIS RACE, PHILADELPHIA, OCT. 9, 1909 (DISTANCE: LAP 8.1 MILES, TOTAL 25 LAPS, 202.5 MILES.)

No.	Car and Driver	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	M.P.H.
4	Simpler..... Robertson	9:18	17:40	25:24	33:55	42:25	50:57	59:31	68:09	76:55	85:31	94:17	102:52	111:23	120:00	131:45	140:30	149:08	157:52	166:32	175:04	183:41	192:19	201:07	209:55	218:58	55.4
5	Chalmers-Detroit..... Dingley	10:12	18:00	26:57	36:28	44:47	53:46	62:50	71:50	81:01	89:55	98:54	107:57	116:53	125:54	134:52	143:49	152:48	161:49	170:41	179:46	188:34	197:30	206:23	215:24	224:20	54.2
8	Apperson..... Harding	13:18	23:06	32:55	41:27	50:38	59:45	68:51	78:02	87:55	96:33	105:30	114:33	123:29	133:10	141:17	150:03	158:53	167:54	176:34	185:38	194:36	203:34	212:33	221:33	230:33	52.2
18	Chadwick..... Park, Jr.	9:13	18:12	29:11	40:01	49:04	58:05	67:10	76:17	85:14	94:11	103:05	111:56	120:47	129:45	138:53	147:50	156:50	165:50	174:50	183:50	192:50	201:50	210:50	219:50	228:50	51.4
17	Icotta..... Strang	9:30	18:38	27:40	37:00	46:29	55:39	65:10	74:25	83:45	92:59	102:16	111:37	120:45	130:09	139:27	148:38	157:53	167:01	176:01	185:01	194:01	203:01	212:01	221:01	230:01	51.3
10	Palmer-Singer..... Wallace, Jr.	9:28	19:18	28:28	37:00	45:30	54:00	62:30	71:00	79:30	88:00	96:30	105:00	113:30	122:00	130:30	139:00	147:30	156:00	164:30	173:00	181:30	190:00	198:30	207:00	215:30	Still running.
3	Benz..... E. R. Bergdoll	10:36	23:32	36:42	49:54	63:06	76:18	89:30	102:42	115:54	129:06	142:18	155:30	168:42	181:54	195:06	208:18	221:30	234:42	247:54	261:06	274:18	287:30	300:42	313:54	327:06	
1	Simpler..... Betz, Jr.	9:36	18:41	27:50	36:53	46:30	55:06	63:12	71:58	80:34	89:10	97:56	106:32	115:08	123:84	132:60	141:36	150:12	158:88	167:64	176:40	185:16	193:92	202:68	211:44	220:20	Broken pump.
2	American..... Drach	8:59	17:40	26:10	35:25	43:37	51:51	60:06	68:12	76:06	84:11	92:16	100:20	108:25	116:29	124:34	132:38	140:43	148:47	156:51	164:55	173:00	181:04	189:08	197:12	205:16	Difficulties resulting from displacement auxil- ary gasoline tank.
9	Buick..... Burman	20:20	28:27	36:42	45:15	53:36	62:12	70:37	78:52	87:06	95:21	103:35	111:49	119:63	127:77	135:91	144:05	152:19	160:33	168:47	176:61	184:75	192:89	201:03	209:17	217:31	Leaky radiator.
23	Selden..... Young	45:48	59:15	70:52	80:23	90:22	100:22	110:48	121:12	132:24	143:58	154:16	164:41	175:03	185:49	196:01	206:11	216:21	226:31	236:41	246:51	257:01	267:11	277:21	287:31	297:41	Still running.
16	Chadwick..... Zengle	8:50	17:34	26:18	35:57	43:37	51:45	60:55	69:40	78:27	87:00	95:31	103:51	112:11	120:28	128:48	136:68	144:88	153:08	161:28	169:48	177:68	185:88	194:08	202:28	210:48	Broken pump.
15	Thomas..... L. J. Bergdoll	9:24	18:28	27:45	37:16	46:59	56:27	65:13	74:13	82:15	90:39	98:54	107:09	115:24	123:39	131:54	139:69	147:84	155:99	164:14	172:29	180:44	188:59	197:14	205:29	213:44	Still running.
13	Buick..... Chevrolet	8:40	17:02	25:21	33:56	42:56	51:56	60:56	69:56	78:56	87:56	96:56	105:56	114:56	123:56	132:56	141:56	150:56	159:56	168:56	177:56	186:56	195:56	204:56	213:56	222:56	Defective water circulation.
7	Acme..... Leinart	14:53	27:44	40:56	53:56	67:06	80:16	93:26	106:36	119:46	132:56	146:06	159:16	172:26	185:36	198:46	211:56	225:06	238:16	251:26	264:36	277:46	290:56	304:06	317:16	330:26	Broken inlet valve.
12	American..... Hays	9:03	19:42	29:15	38:39	48:38	58:17	68:11	78:11	88:11	98:11	108:11	118:11	128:11	138:11	148:11	158:11	168:11	178:11	188:11	198:11	208:11	218:11	228:11	238:11	248:11	Still running.
19	Chalmers-Detroit..... Lorimer	9:55	18:31	27:36	36:45	45:38	54:38	63:38	72:38	81:38	90:38	99:38	108:38	117:38	126:38	135:38	144:38	153:38	162:38	171:38	180:38	189:38	198:38	207:38	216:38	225:38	Still running.
6	Thomas..... Haupt	14:59	26:20	37:19	48:19	59:19	70:19	81:19	92:19	103:19	114:19	125:19	136:19	147:19	158:19	169:19	180:19	191:19	202:19	213:19	224:19	235:19	246:19	257:19	268:19	279:19	Still running.
20	Welch..... Howard	10:44	19:43	28:43	37:43	46:43	55:43	64:43	73:43	82:43	91:43	100:43	109:43	118:43	127:43	136:43	145:43	154:43	163:43	172:43	181:43	190:43	199:43	208:43	217:43	226:43	Still running.
14	Columbia..... Coffey	12:47	21:02	29:17	37:32	45:47	54:02	62:17	70:32	78:47	87:02	95:17	103:32	111:47	119:62	127:77	135:92	144:07	152:22	160:37	168:52	177:07	185:22	193:37	201:52	210:07	Still running.
22	Lozier..... Seymour	10:44	19:43	28:43	37:43	46:43	55:43	64:43	73:43	82:43	91:43	100:43	109:43	118:43	127:43	136:43	145:43	154:43	163:43	172:43	181:43	190:43	199:43	208:43	217:43	226:43	Still running.
11	Alco..... Grant	12:47	21:02	29:17	37:32	45:47	54:02	62:17	70:32	78:47	87:02	95:17	103:32	111:47	119:62	127:77	135:92	144:07	152:22	160:37	168:52	177:07	185:22	193:37	201:52	210:07	Still running.
21	Welch..... Hall	10:44	19:43	28:43	37:43	46:43	55:43	64:43	73:43	82:43	91:43	100:43	109:43	118:43	127:43	136:43	145:43	154:43	163:43	172:43	181:43	190:43	199:43	208:43	217:43	226:43	Still running.

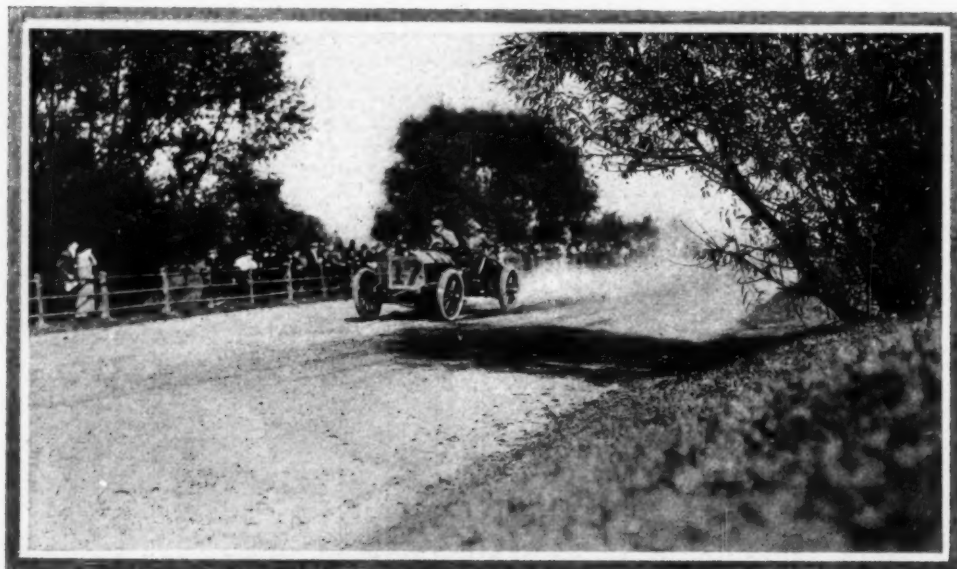
NOTE—Comparing the winner's time and average with the time and average of the same man, winner last year, although driving a different make of car, gives some idea of the progress made in the last year by the various drivers. Just a year ago, Robertson, driving a Locomobile "40," went the distance, then 195 miles, in the time of 4 hours, 2 min. 30 sec., which was then considered very good. This averages to 48.27 miles per hour as compared with Robertson's time this year, which works out 55.9 miles per hour. The whole advantage of 7.63 miles per hour average cannot be ascribed to improvement in construction, as the past has been a year in which the majority of constructors have "stood pat." So, too, with the fastest lap. Last year, Seymour, driving a Lozier, completed his tenth circuit of the 7.8 mile course in 8:32. This year Zengle, at the wheel of a Chadwick, carried off the honors with 7:41 for the 8.1 miles. The assumption almost forces itself upon one giving this thought that the drivers are much faster than other and previous years.



Harding's Handling of the 60-H.P. Apperson Gave the "Jack Rabbit" Third Place



Parkin, Junior, and Parkin, Senior, Capably Piloted the Big Chadwick "Six"



Strang Looked Familiar at the Wheel of the Isotta, and Finished Fifth

SOME RACE GOSSIP

Robertson's one stop at the end of the 13th lap, gave the stands an opportunity to witness action. Robertson was not fairly out of his seat before the Simplexites were all over the car. There was system in the apparent confusion, though, and "Robby" was sent on his way with an encouraging cheer echoing behind him. But the "real goods" in quick action was afforded by the Appersonians, whose pit was almost directly opposite the press stand. Harding, for one reason or another, seemed to stop more often than any of the real contenders. At one stop a new tire was put on and tanks filled in a trifle over one minute.

No. 21, the Welch car that was to have been driven by Al. Hall, did not start, as Hall, who had been arrested earlier in the week for disregarding the signals of the "coppers" and assault on an officer, was disqualified by the contest committee of the Quaker City Motor Club for failure to live up to the practice rules. His \$500 entrance fee was returned, and he and his pretty wife, who is the sister of the Bergdoll boys, who drove No. 15 Thomas and No. 20 Welch, and for whom Hall was formerly chauffeur, witnessed the race from the grand stand.

That Job of Starting — Thursday night previous to the race a movement was started by some one among the drivers to depose G. Hilton Gantert from the starter's position on the grounds of inexperience and trade alliances. A "round-robin" was circulated among the drivers, pretty generally signed, and presented to the race committee. As Mr. Gantert is the Q. C. M. C.'s official starter the club refused to impugn his integrity, especially in view of the fact that no representative of the cars he handles was in the race. "Wag," however, served as associate referee.

A big smoker in the huge banquet hall of the Hotel Walton wound up the festivities, at which Mayor Reyburn and all the celebrities were present, including the winning drivers, who were after their plunder. The possible filing of a protest by the Chalmers - Detroit people against the Simplex necessitated the calling off of the distribution, which was to have been one fea-

ture of the symposium. The prizes will be given out Thursday night at Keith's Theater, providing there is nothing further turns up to interfere with plans of the management.

Among the out-of-town automobilists who toured from New York to the race was a large contingent from J. M. Quinby & Company, which has recently taken over the Isotta Import Company of New York. The party came, hoping to see Louis Strang celebrate the return to his first love with a victory not unlike the four successive ones of a year ago. In the Quinby party were: President W. W. Ogden, Vice-President Emerson Brooks, Sales Manager Rockett, Claude Hamilton and Charles G. Percival, publicity manager.

WHY SOME CARS DIDN'T PERFORM BETTER

No. 9 Buick stopped at the pits on the second lap to change spark plugs and repair a badly leaking radiator. Large quantities of flaxseed were poured into the radiator in the vain endeavor to stop the leakage. Finally Burman withdrew on this account, it being impossible for him to continue in the race and make any kind of a showing.

Both Willie Haupt, driving No. 6 Thomas, and Chevrolet, driving the Hoodoo No. 13 Buick, broke inlet valves. Haupt replaced ~~the~~, but Chevrolet had to drop out, as the broken valve punched a hole in the cylinder.

Bergdoll's No. 15 Thomas had such a chronic case of overheating that he finally had to withdraw, this being all that could be determined as to his failure.

Drach, driving an American bearing the same number as at Lowell, No. 2, while making good time for the first few laps, finally had mechanical difficulties which put him out of the race. His first stop was to replace a rear auxiliary air valve. This was followed by the loosening of his auxiliary gasoline tank. The feed pipe unions to the carburetor cracked because of the displaced tank and Drach had considerable difficulty in bringing the car to the pits. After another unsuccessful attempt to fix up the feed pipe the car was withdrawn.

The other American, driven by Hayes, met with disaster at Sweet Brier hill. Hayes stated that first one and then the other rear tire gave way when he set his brakes. The reaction threw the car into the ditch. As it was, Hayes experienced great difficulty to keep from hitting the telephone pole head-on.



This Photograph Was Taken Just as No. 12 American, E. O. Hayes Driving, Punctured and Swung Into a Telephone Pole

No. 10 Palmer & Singer made a good showing, considering that Wallace had to drive the major portion of the race with a broken universal joint.

No. 3 Benz broke an exhaust valve on the third lap and stopped at the pits to replace it. It continued in the race after making the replacement, although hopelessly behind.

The Acme was very unfortunate, having almost no mechanical trouble, but its slow speed was due to continuous tire trouble. The rims would constantly become loose, and the difficulty was finally found to be the use of 4 1-2-inch tubes in 5-inch covers.

Coffey, driving No. 14 Columbia, gave the reason for his accident. Parkin, Senior, also verified the tale. The big Chadwick made a bad skid when turning into City Line avenue, and Coffey, in order to avoid crashing into the Chadwick, tried to go outside between a tree and the car. His rear axle struck the tree and simultaneously his front wheels struck the right rear wheel of Parkin's car. The Columbia's rear axle was torn from the spring clips, so violent was the impact. On the other hand, Parkin's rear wheel was badly loosened up, but by running the risk and doggedly pushing the car along he finished fourth, ahead of the Isotta, which did not stop except for fuel.

Betz, the young amateur driver, after having third place well in hand with No. 1 Simplex on the sixteenth lap, was forced to withdraw on account of a broken pump and overheated motor.

Zengle, with the big Chadwick, which made the fastest time, literally shook his water pipes loose. The pipes on top of the cylinders were leaking badly, and finally, it was stated, his water-pump drain plug opened. The motor ran hot, and it was reported Zengle went down to the Schuylkill River to get water to replenish the empty motor. After this, however, he never was a factor in the race. At the time of this accident he was running second.

No. 22 Lozier was reported to have broken a pump shaft on the first round. Another equally definite rumor was that the after main crankshaft ball-bearing rod broke.

No. 19 Chalmers-Detroit on the fourth lap broke its frame and, of course, retired.

Perhaps the most exasperating incident to happen during the ray was to Harry Grant's No. 11 Alco. As he drew up to the grand stand preparatory to the start, the brazing on his steering column gave way, allowing the wheel to turn independent of the worm and rendering steering impossible.

VANDERBILT RACE PREPARATIONS ARE IN FULL SWING

RUNNING of the Vanderbilt Cup race this year was finally assured when the Board of Supervisors of Nassau County, Monday last, granted permission to use county roads to complete the course. The race is now positively scheduled for October 30.

The course is 12.64 miles long, including, in addition to 5.15 miles of the Long Island Motor Parkway, which is private property, the Massapequa road, the old Country road and the old Westbury road. According to the conditions imposed, the race must be run between 5 a. m. and 5 p. m., October 30, and the contestants are granted permission to use the roads for practice between 5 a. m. and 8 a. m. after October 20.

Further conditions are that the Motor Cups Holding Company, which is promoting the race, must sprinkle the Massapequa road with oil, repair and make safe the old Country road, and must guard and police the roads during practice and on the day of the race. A bond of \$100,000 must be deposited to in-

a. m. give a longer time each day. The offer of practice should induce manufacturers to make early entries, as the more trials the drivers have the better, of course, will be their chances in the race. It should be noted that the course is open for practice to contestants only. No permission has been granted for private owners to use it other than in the ordinary way and at their own risk in practice hours.

Anderson Brothers, of Mineola, already have a large force of men at work widening the county roads, clearing out the gutters, filling in holes and rolling and oiling the roads. As in previous Vanderbilt races, a complete telephone system will be installed. At each point at which communication is likely to be necessary a station will be established and connected with the official stand by a direct private wire.

No official announcement of the entries can be made yet, as the entry blanks were only issued a few days ago. Enough favorable responses have been received, however, to indicate that at least thirty-five cars will start. The throwing of the race open to stock cars has proved a great incentive to the manufacturers. Among those who have promised to compete are the Chalmers-Detroit Motor Company, with four cars; the Maxwell-Briscoe Motor Company, with three; the National Motor Vehicle Company, the Buick Motor Company, the Simplex Automobile Company, Marmon & Nurdyke Company, the Dayton Motor Car Company, the Knox Automobile Company and the Rainier Motor Company, all with two cars each. There is a possibility of two Benz cars being entered if they arrive from Germany in time. In addition to those who will enter teams, Renault, Moon, Fiat, Isotta, Apperson, Columbia, Allen-Kingston, Alco, Mercedes, Sharp-Arrow, Cameron and Matheson will be represented by at least one car each.

Many familiar names will be found missing from the revised course. From the starting point opposite the grandstand, the route runs east along the Parkway for about two miles; the cars then turn north on a specially constructed cut-off to the Massapequa road, which leads to the outskirts of Hicksville. From here the cars turn west on the old Country road to Westbury, thence south to the Parkway at Meadowbrook Lodge.



A Lodge Entrance to the Long Island Motor Parkway

demnify the County Supervisors and Sheriff against any damage suits, and the sum of \$500 must be deposited to put the roads in condition after the race. It is also provided that if any of the entrants are convicted of violating the speed laws outside of practice hours they and their machines are to be disqualified.

The Motor Cups Holding Association opened a bureau of information this week in room 212 of the Long Acre building, 1493 Broadway, New York City, on the northwest corner of Forty-third street. This office will be open daily from 9 a. m. to midnight, and on Sundays between 2 and 7 p. m. The association has prepared diagrams of the stand, boxes and parking spaces, and the sale of seats has begun. Several hundred applications for seats and boxes are already on file. Prospective applicants are urged to write or call as soon as possible, as it seems almost certain that the demand will exceed the supply.

The course promises an unusually fast race, and also a spectacular one. It will be noticed that the length of the circuit has almost been cut in half. This was done because it was found, from experience at Lowell, Fairmount Park, and elsewhere, that the spectators enjoy a race on a short course more than on a longer course, as the cars pass more frequently. There are no hills and no bad turns on the new course, and the few turns which do exist will have a four-foot bank, carried well around in the straight. The turns on the Parkway, of course, are banked in the most scientific manner. Expert drivers figure that the time should at least equal that made at Riverhead in the Long Island Derby.

Ample time for practice will be allowed the drivers, as they can let their machines out to full speed on the course for ten days before the race. This is not only giving more days of practice than was ever allowed before, but the limits of 5 to 8



Hudson "20" Tries Straightaway with No Speed Limit

FOR AND ABOUT THOSE WHO COMPETE

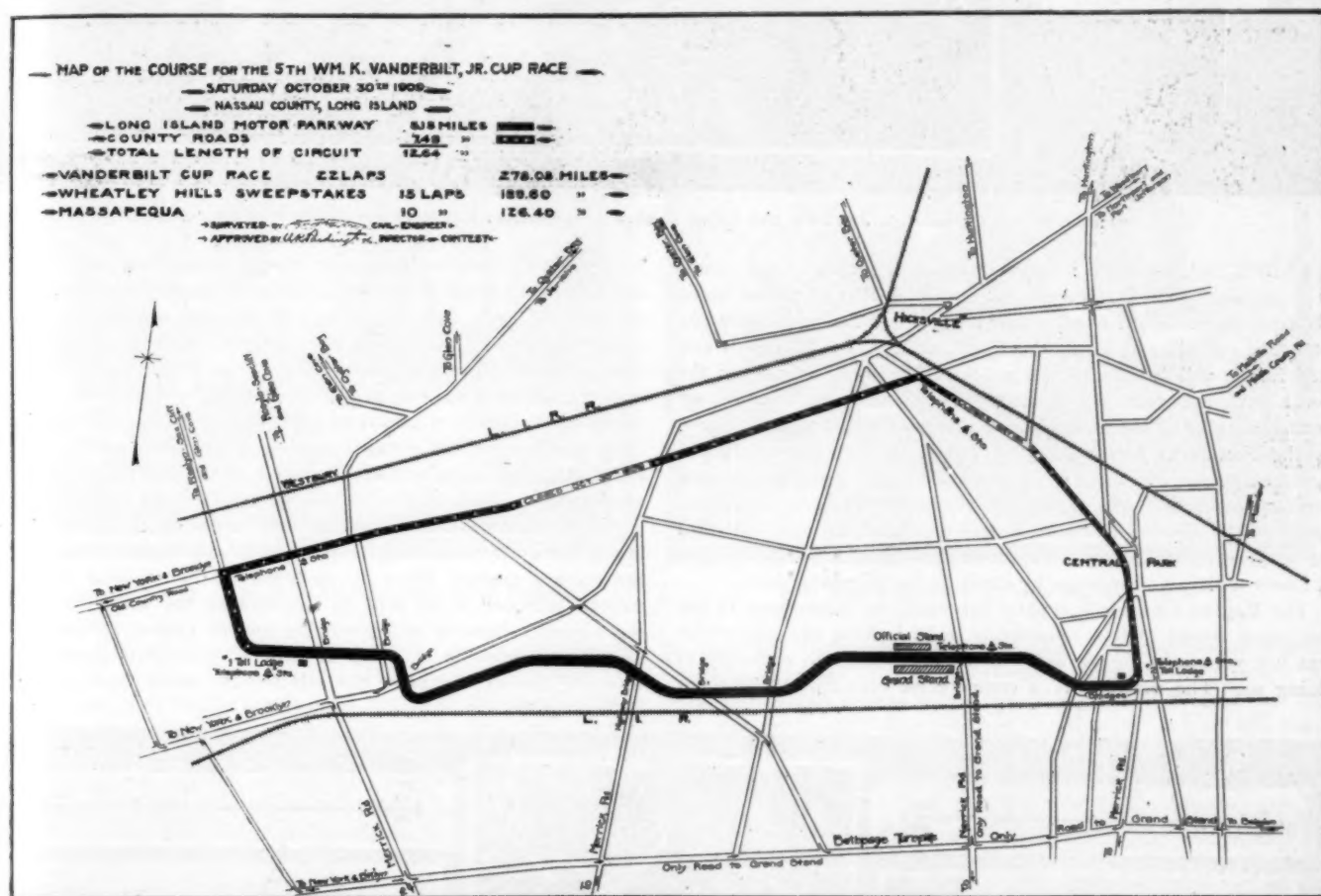
Ralph De Palma Injured at Danbury—The Vanderbilt lost one of its most promising candidates last Saturday when Ralph De Palma, the winner of the Long Island Derby, was spilled from his car on the Danbury, Conn., race-track. The accident happened during the last lap of a five-mile free-for-all, which was contested by De Palma, driving his Fiat "Cyclone," Brown with another Fiat, and Wagner with a Columbia. De Palma had been having trouble with his machine, but overcame it and started after the others. He passed Brown and was overhauling Wagner, when a rear tire burst, causing the machine to crash through the infield fence and turn turtle. De Palma was thrown some twenty feet, landing on his side. He suffered a compound fracture of the left upper leg, and although out of danger, there is no possibility of his taking part in the Vanderbilt.

Race Meet in Lone Star State—The San Antonio Automobile Club is promoting a series of races to be held on the last four days of the International Fair, November 14 to 17, at San

sand spectators who lined the course saw some keen competition. The hill, although but one-sixth of a mile long, is quite steep, having a grade of 12 per cent. at the bottom, increasing to nearly double that figure at the top. The crowds caused some trouble by getting on the course. The best time, 17 1-5 seconds, was made by W. Stuller, driving a 35-horsepower Jackson, who won in his class and also in the free-for-all.

Jackson Wants the W. & S. Trophy—Word comes from Indianapolis that the Jackson Automobile Company has filed a suit against the Indianapolis Motor Speedway to force the latter to award it the Wheeler & Schebler trophy. This is in addition to the suit filed some weeks ago in which the company asks for \$100,000 damages. In the 300-mile race for the trophy at the Speedway in August, Lynch, driving a Jackson, was in the lead when the race was called off because of accidents.

Bosch Prize Offer Still Holds—The Bosch Magneto Company says that the prizes it offered for the postponed Brighton Beach 24-hour race will hold in the coming race, October 15



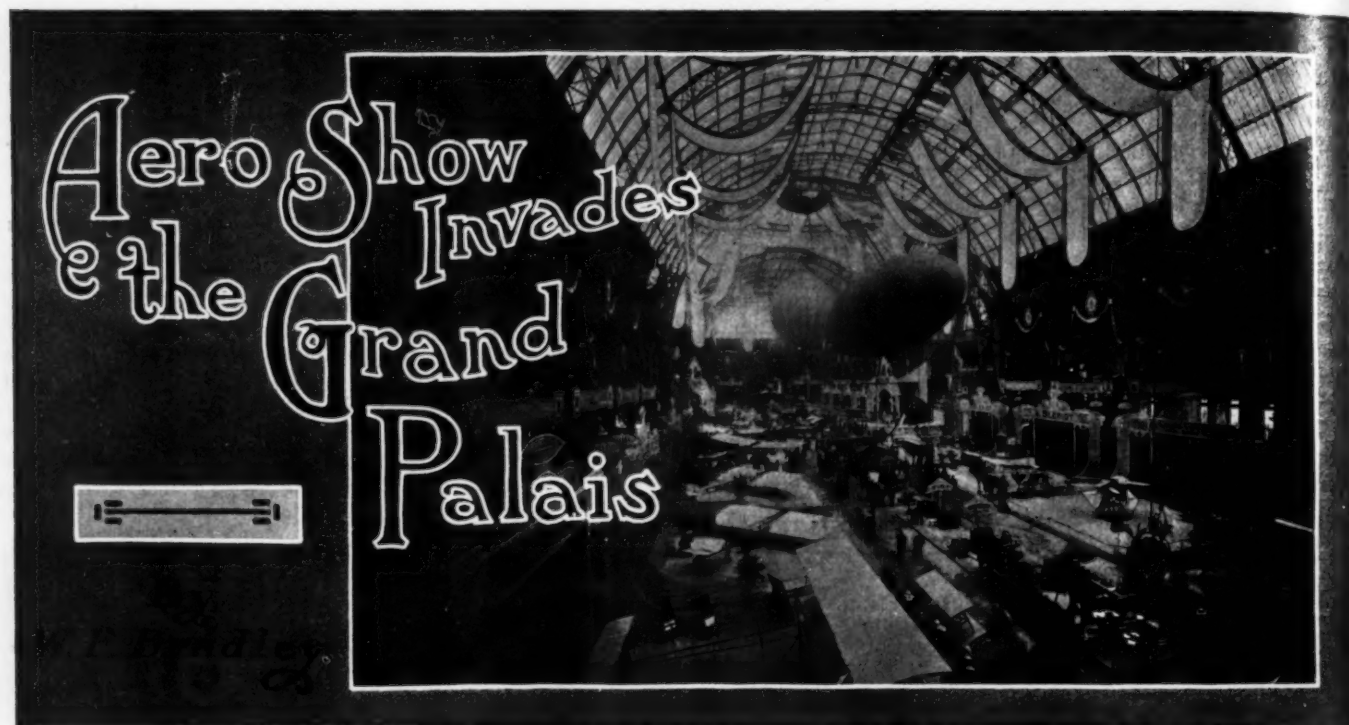
Antonio, Tex. Entry blanks have been sent out, and, in view of the attractions offered, should meet with a favorable response. A special automobile track is being constructed, which, although only three-quarters of a mile in length, is of ample width and has well-banked turns. Safety is provided for by a sloping wall of loose earth taking the place of the outer fence, which, in the event of a racer becoming uncontrollable, will bring it to a gradual stop. The program for the first day calls for five races, at distances of from five to 25 miles, for cars classified by price limits. On the second day will be held four races distinguished by piston displacement. The third day will see the free-for-all, a winners' race and record trials, and the conclusion, on the fourth day, will be a six-hour race.

Hill Climb of Ohio "Twin Cities"—The second annual hill climb of the Twin City Automobile Club, of Uhrichsville and Dennison, O., proved no small success, and the several thou-

and 16. The prizes, it will be remembered, were \$100 to the winner, and an additional \$50 if George Robertson's record for this year of 1,091 miles was broken, conditional upon the use of a Bosch magneto on the winning car.

Racing for Good Roads Benefit—A novel plan of assisting the good roads movement in Louisiana has been originated by the New Orleans Automobile Club, namely, holding a race meet, of which the proceeds are to be devoted to the cause. The meet will take place November 20 and 21, following the first annual meeting of the Louisiana Good Roads Convention.

France May Revive the Grand Prix—The sporting commission of the A. C. F. met October 6 to consider the advisability of offering the Grand Prix for a race in 1910. The secretary was empowered to find the sentiment among the manufacturers. If the race is held it will be without any conditions whatever regarding the construction of the competing cars.



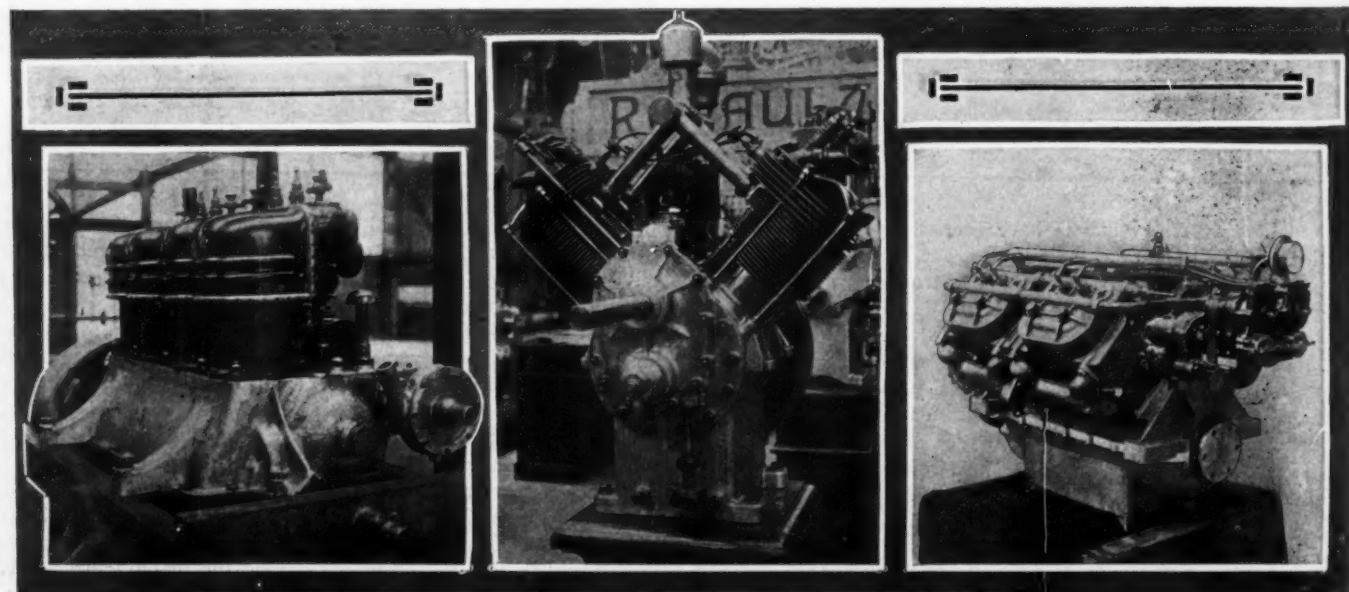
Interior of the Grand Palais Where the Great French Aeronautical Exhibit Now Holds Full Sway

PARIS, Oct. 7.—More inventive genius is shown in the motor section of the Paris Aero Salon than in that portion devoted to aeroplanes. With one or two exceptions, the aeroplanes are standard models which have been making flights all the year and are fairly well known to the public. The newcomers, for the most part, are neither convincing nor pleasing in their workmanship. One of the most obvious pieces of plagiarism ever seen is the Fernandez biplane, copied from the Curtiss, which was seen at Rheims. As the American machine only arrived in France toward the middle of August, M. Fernandez is to be congratulated on the speed with which he has produced his copy. Instead of suspending the motor between the planes, Fernandez has put it lower with a transmission by chain to the propeller shaft.

The Bayard-Clément Company has made its appearance in the aeroplane world with a remarkably good-looking biplane, which has not yet made flights, but which should have no difficulty in doing so. The machine is a compromise between the Wright,

Farman and Curtiss, the main wings resembling the Wright without being flexible, however, the front elevation rudder is of the Farman type, as is also the tail, and the *ailerons* are very similar to those used by Curtiss. The aeroplane is driven by a four-cylinder Bayard-Clément motor placed behind the pilot, and transmitting to the propeller through a clutch, a spring-mounted shaft with a universal joint and inclosed reducing gear. Maurice Clément, the younger brother of the unfortunate Albert, killed at Dieppe, is now making trials with the new machine. The workmanship, both of the biplane and the engine, is fine.

Airship motors occupy a very large amount of place. Certainly the most interesting is one of the new four-cylinder, 200-horsepower engines about to be fitted to the monster dirigible balloon intended to be sent to England by the aerial way. As the airship's capacity is 6,500 cubic meters (about 270,000 cubic feet), it is possible to equip it with very large engines. The Bayard-Clément Company has selected the same type of motor



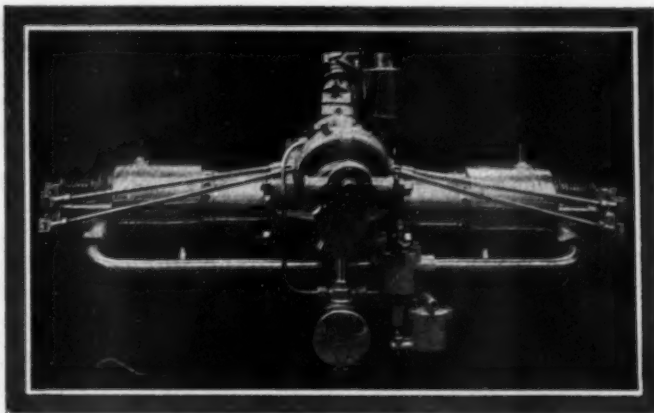
Bayard-Clément 45-H.P. Aero Motor

Renault Motor with Camshaft Drive

Compact DeDion Aeronautical Motor

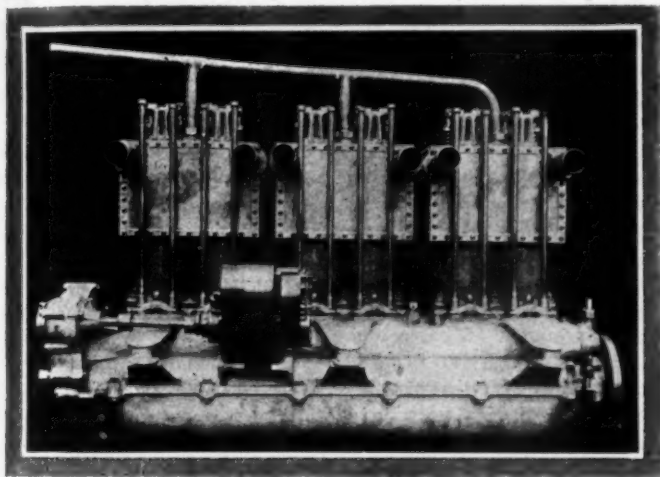
as was used on last year's racing cars at Dieppe and at Savannah, but instead of a bore of 155 millimeters has adopted one of 190, or 7.4 inches, with a stroke of 9.1 inches. Each engine is rated at 200 horsepower. In the design only a few details have been departed from the racing-car model. The cylinders are cast in pairs with the valves inclined in the head and operated by an overhead camshaft running right down the center of the motor, exhaust valves being at one side and inlets at the other. A hemispheric combustion chamber is employed with very high compression. For starting, the compression is relieved through a special type of ball compression cock. The cylinders are fitted with rivetted-on copper jackets, through which the water circulates by pump feed. Double ignition is employed, both plugs being just below the inlet valve. The distributor is worked off the end of the overhead camshaft, which, by-the-by, is driven by inclosed gearing, vertical inclosed spindle and bevels. The base of the crank chamber forms the oil reservoir and oil is delivered under pressure to all the main bearings.

The engines will be mounted on an automobile type of chassis, side by side, each carried on short transverse springs. It is thus possible to disconnect the springs and lift out engine and chassis as one unit. A special type of band clutch is employed with con-

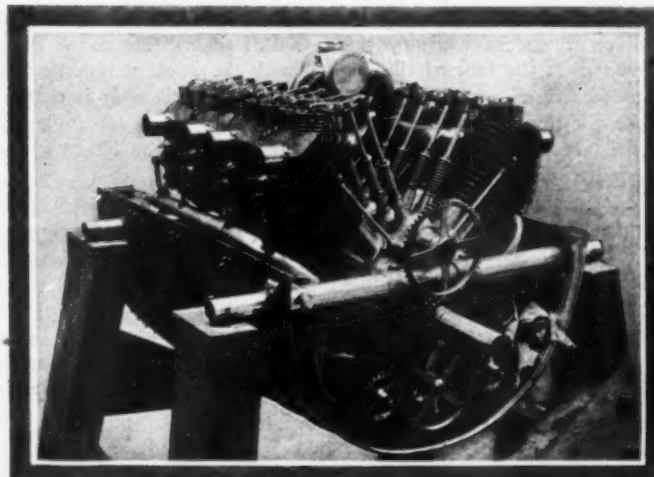


Darracq 30-Horsepower Two-Cylinder Opposed Motor

There is an even greater selection of engines for aeroplane work than for dirigible balloons, the array comprising every model from the two-cylinder, air-cooled horizontal to the sixteen-cylinder, water-cooled "V" and the twelve-cylinder rotary.



Operating Side of Buchet Six-Cylinder Aero Motor

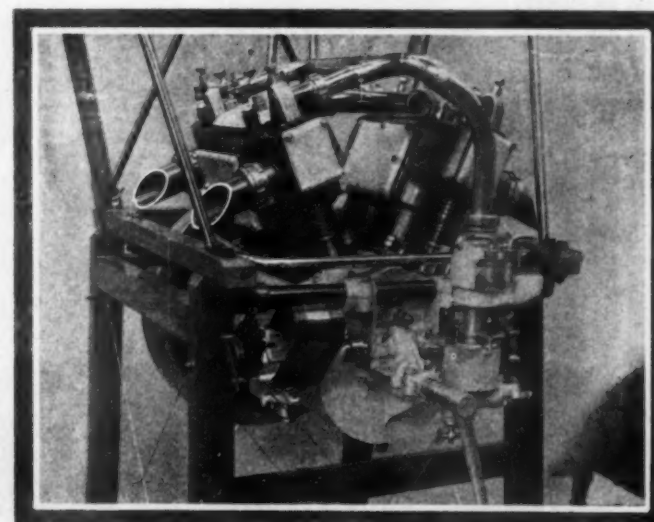


Flat Eight-Cylinder V-Type Aviation Motor

nection by a shaft from this to a gear box, also carried on the chassis. The engines being side by side, lengthwise of the airship, the propeller shafts are at right angles to the engine shaft, projecting respectively to left and right of the steel car. Bevel gearing is, of course, employed, the propellers being mounted in the center of the airship, as on the Zeppelin and the ill-fated *République*. Should one engine be stopped, it is declutched and its shaft between the clutch and gear box connected up to that of the live engine by means of a transverse chain. By putting in the low gear it will be possible to make progress. The propellers will be wooden ones built by Chauvière, designed to turn at a low rate of speed.

One of the largest motors is shown by the Wolseley Company, of England. Although not the most powerful, it is the largest in overall length, the eight cylinders, cast in pairs, being placed in Indian file. De Dion-Bouton shows several types of eight-cylinder "V" engines, the distinctive feature of which is the use of two independent magnetos mounted on a bracket near the top of the cylinders.

Panhard has had more experience in airship engine building than probably any other firm, having equipped all the military airships, including the *Patrie* and the *République*. On the new model, with four cylinders cast separately and fitted with copper jackets, the magneto is carried on the top of one of the cylinders, driven by bevel gearing and vertical shaft. The object is, of course, to give greater accessibility, the usual position being very inaccessible when the engine is of necessity carried on the floor.



Water-Cooled 45-Horsepower Mors Aero Motor

these the propeller is carried on the reinforced camshaft. A light-weight, water-cooled model also figured on their stand, the cylinders being separate, with copper water jackets and valves in the head, side by side and operated by a single camshaft. The lower portion of the crankcase, of considerable depth, forms an oil reservoir, from which the lubricant is pumped.

An engine which attracted attention is the one with which Santos-Dumont made his fast cross-country flights. The motor is now the subject of litigation, the Darracq Company claiming that it is a special type loaned by them to the Brazilian aeronaut and Santos-Dumont maintaining that he ordered it and paid for it and can therefore do with it as he wishes.

The engine is of the two-cylinder opposed type, with copper water jackets. Its originality lies in the timing gear, a single cam operating all four valves, carried in the head, and only two gears being employed for the valve mechanism, pump and magneto. This suppression of organs has allowed a reduction of weight without any scraping away of metal in essential parts.

Mors has come forth with an entirely new engine of the four-cylinder "V" type, the cylinders being cast in pairs with their water jackets. This disposition allows the use of a two-throw crankshaft, and as the cylinders are offset in relation one to the other, the connecting rods can be attached side by side to the same crankpin without the use of forked ends. The exhaust valves are mechanically operated, two of them being at the front and two at the rear of the engine, with the inlets automatic and immediately above them. A special type of carbureter is carried with the float chamber placed so low that at whatever angle the motor is placed the level of the gasoline is not likely to be seriously disturbed.

The general tendency among French constructors, however, is to produce an aeroplane engine on standard lines—that is, four or six vertical cylinders, saving weight in the water jackets, valve mechanism and certain portions of the crank case casting. It is the type of motor first introduced by Wilbur Wright. The changes that can be worked on this model are infinite.

Bayard-Clément, for instance, has produced a 40-horsepower, four-cylinder model with all valves on one side in an outstanding pocket. The engine is a single casting with all metal cut

away between the second and third cylinders and the usual cast water jacket is replaced by a one-piece copper one. Thus to look at the valve side of the engine the impression is that it is a standard type of motor with valves in pockets on one side only.

Buchet has endeavored to make a saving of weight in a somewhat similar manner. His vertical six-cylinder engine has cylinders cast in pairs with but a framework cast around the two sides and the ends of the cylinders, and to this framework the aluminum flat plates forming water jackets are screwed on. The arrangement allows the thickness of the cylinder walls to be verified with accuracy and naturally decreases weight, for the aluminum plates are much lighter than a cast jacket. All valves are on one side, thus requiring but a single camshaft, and are in the head, side by side. One of the features of the engine is that the piston is bored with holes in all its lower portion.

Antoinette shows the first of the new sixteen-cylinder motors with the cylinders in V. The only respect in which this differs from the eight-cylinder model used by Latham is in the number of cylinders, the engine being practically two eighths on a crankcase of double the usual length. The new model in both eight and sixteen cylinders has one-piece copper-deposited water jackets. This allows a cylinder with a fixed head, and as the only joint in the jacket is at the base of the cylinder the possibility of leaks is reduced to a minimum. Formerly the separate head was liable to allow leaks from the cylinder into the jacket, the water being driven out and overheating occurring. A very similar type of jacket is employed on the E. N. V. motor used by Blériot and on the new Brouhot eight-cylinder motor.

Gabriel Voisin, the maker of the well-known type of biplane, after fitting his biplanes with any type of motor selected by his clients, has now built an engine after his own ideas. It has four separate cylinders with copper jackets and concentric valves in the head. The cylinders are given considerable offset and are mounted on an aluminum crankcase, the sides of which are screwed on. The timing gears are contained within the crankcase and not in an extension, being reached only by taking down the sides of the crankcase. The high-tension magneto is carried on a bracket at the rear of the engine immediately above the crankshaft, its gears being within the case.



Court of Honor at the Grand Palais Aero Show—Blériot Aeroplane that Crossed English Channel Occupying Post of Honor

Americans Plowed Best at Amiens



On the Field at Amiens During the Agricultural Trials Which Were Won by an American Tractor Plow

AMIENS, FRANCE, Oct. 5—France is seeking to encourage the use of the internal combustion motor among agriculturists, both for work on the farm and for the transport of farm produce. The methods pursued are to hold an exhibition annually in different parts of the country and at the same time to put on foot various competitions.

The spot chosen this year is Amiens. But the northern Frenchman seems to be harder to convert than his compatriot of the center. Manufacturers appear to know of this, many of them who were present at the last exhibition held at Bourges being absent at this. The agriculturist comes in numbers to see the new-fangled notions, but he comes with his mind made up that they are not much good. Thus, before it is possible to sell him a machine, it is necessary to convert him, and the task is not an easy one.

The exhibition comprises two large halls with an open-air exhibition between them. Apart from the purely agricultural exhibits the hall contains gasoline and gas engines of various types, most of them driving agricultural machinery. The French manufacturer is convinced that the best type of motor for stationary farm work is a single vertical cylinder. The long-stroke, slow-speed horizontal motor so commonly employed in America for this class of work is not seen here.

The Ceres Company had one of the neatest outfits in this line, the engine being mounted on a truck and connected by belt to a countershaft with a series of pulleys from which the drive could be taken to the various machinery. The engine, which was of practically standard design, was cooled by a circulation of water contained in a circular radiator mounted on the truck, the center of the radiator containing a fan driven by belt off the engine. The entire outfit was protected by a galvanized iron roof. Small stationary engines for pumping water or driving light machinery were plentiful, most of them being mounted on portable platforms. Magneto ignition is employed on even the smallest of these outfits.

Instead of being shown in the exhibition hall, the automobiles designed for farmers' use were kept on the road giving demonstrations of their ability to do a day's work. Working with the three or four French trucks was an American buggyabout, the first of its kind ever shown in this portion of Europe. It was shown by the French branch of the International Harvester Company. French automobile manufacturers have made no effort to provide a vehicle for the farmer, for it cannot be maintained that the low-powered, low-built runabouts introduced at these exhibitions is an agricultural vehicle. As plowed fields are the same the world over, and even highly developed France has byroads that cannot be traversed by the standard type of automobile,

there is no reason why the American buggyabout should not be adopted by the agriculturists of France.

Plowing without the use of horses was one of the most important features of the Amiens exhibition. Here honors fell to the Cima, under which title is hidden a tractor produced by the International Harvester Company. This machine worked with perfect regularity, plowing on the first day 3 1-2 acres of land in 5 hours 55 minutes, with a consumption of 8 4-5 gallons of gasoline and 4 1-2 gallons of water. On the second day the same machine worked 6 hours 35 minutes, plowing 3 3-4 acres, with a consumption of 9 3-5 gallons of gasoline and 16 gallons of water. The American machine was awarded the first prize of the Automobile Club of France.

Neither of the two French machines was able to get through a day's work. The competitors were of two entirely different classes, the Landrin being a tractor, like the International Harvester Company's machine, while the Bajac operated by winding drums. The Landrin had a standard type of four-cylinder engine mounted on a stout chassis, drove to the rear wheels through side chains, and at the rear had a revolving drum with plowing blades driven by chain from a countershaft on the chassis. As the ground in the neighborhood of Amiens was particularly rocky the blades did not last long; they first buckled up, then broke off altogether.

The Bajac, with its winding drums, was some time before it could be got into working condition. When it did start its furrows were not made with all the straightness demanded by critical agricultural eyes. A two-cylinder vertical engine provided the motive power to the winding drums, which were driven by an overhead shaft meshing with a large pinion on the end of each drum. A special type of plow was employed, an operator sitting on a bogey attached to it and directing its course and depth of operation. When the end of the field was reached the plow was swung round without the plowman descending from his seat and operation in the opposite direction was commenced. As this machine needed three men, one on the plow, one at the engine and another at the winding drums, it was obviously costly to work.

The American machine was the standard pattern operated by a long-stroke, slow-speed, horizontal single-cylinder gasoline engine. The plow was towed behind, the operation only requiring the presence of two men, one being on the tractor and the other at the plow.

A useful competition was held among mechanics and farm workers in testing their ability to repair motor and various types of agricultural machinery. A stationary engine was purposely put out of business in some artful manner and the competitors,

some twenty in number, invited to find the cause of the breakdown and repair it as quickly as possible. Various farm machinery was treated in the same way.

A conference on the use of motors in agriculture was held during the exhibition period, the delegates representing practically all countries in Continental Europe interested in agriculture.

SALZER, MERCEDES, SEMMERING HERO

BERLIN, Oct. 1.—The Semmering hill climb, the blue ribbon of Austrian motoring, was held on the 19th over a distance of ten kilometers on the tortuous Semmering road. The course was in splendid condition and the entries, though not as numerous as last year, included drivers of international repute, such as Cole, Poege, Salzer, Lindpaintner, Joerns, Duke Ludwig Wilhelm of Bavaria, Prince Francis Joseph of Braganza (whose brother has just married Miss Anita Stewart), Count Kolowrat, etc.

The hero of the day was Salzer in a Mercedes, who beat the Semmering record in splendid style, covering the distance in 7 minutes 7 seconds, definitely winning the trophy for Anton Dreher, Vienna's prominent sportsman. The class he started in was for vehicles without restriction, and he beat W. Poege's Mercedes by 62.5 seconds, with Cole in the Benz third in 7 minutes 28.4-5 seconds.

Others who were placed were Joerns and Lindpaintner, both in Opels, while Prince Francis Joseph did not finish. In the section for cars from 35 to 46-horsepower, Joerns carried off the prize in 7 minutes 54.3-5 seconds, beating Cole in the Benz.

GERMAN CARS FOR 1910 GRAND PRIX

BERLIN, Oct. 1.—In the Grand Prix of 1910, which is said to be looming on the horizon, it is stated that three German firms have announced their intention of participating—Mercedes, Benz and Opel. There will be no voiturette tour in Germany this autumn after all, as the industry cannot see its way clear to participate in such an affair at this late date, and the event will probably take place next spring. The German victory in the last Grand Prix has greatly stimulated the racing spirit.

AMERICAN CARS POPULAR IN NOVA SCOTIA

The following information concerning automobiles in Nova Scotia is furnished by United States Consul Alfred J. Fleming, who is stationed at Yarmouth:

Yarmouth has only a trifle over 6,000 people, yet there is a great deal of wealth here, and this is revealed in a very pronounced manner by the number of automobiles owned. There are about 110 automobiles in Nova Scotia, and 36 of these are owned in this city, Amherst having 30 and Halifax 25. The 36 autos in Yarmouth cost \$44,475, 32 being American make, 3 Canadian and 1 English. Of the \$44,475 invested, all save \$7,000 was spent in the United States, which is in itself an evidence that the American-made machine is popular in Canada. Of these 36 machines, 16 are runabouts and 20 tourist cars. Most of them are good machines and a few of them are first class.

Counting the 110 machines in Nova Scotia at the average price of the Yarmouth machines, makes \$135,811 invested therein in this province, and if the same average as to place of make holds good as in the case of Yarmouth, nearly all this money found its way to the United States.

The roads in this province are exceptionally good for automobiling and are praised by the scores of American autoists who have visited Nova Scotia. One drawback to automobiling here is the law prohibiting the running of machines in the various towns and counties and municipalities on certain days. For example, automobiles cannot run in Yarmouth County, outside the city, on Saturday; Digby County has one or more prohibited days; Annapolis, Kings, Queens, etc., have days in which autoing is forbidden by local regulations, municipal and town ordinances.

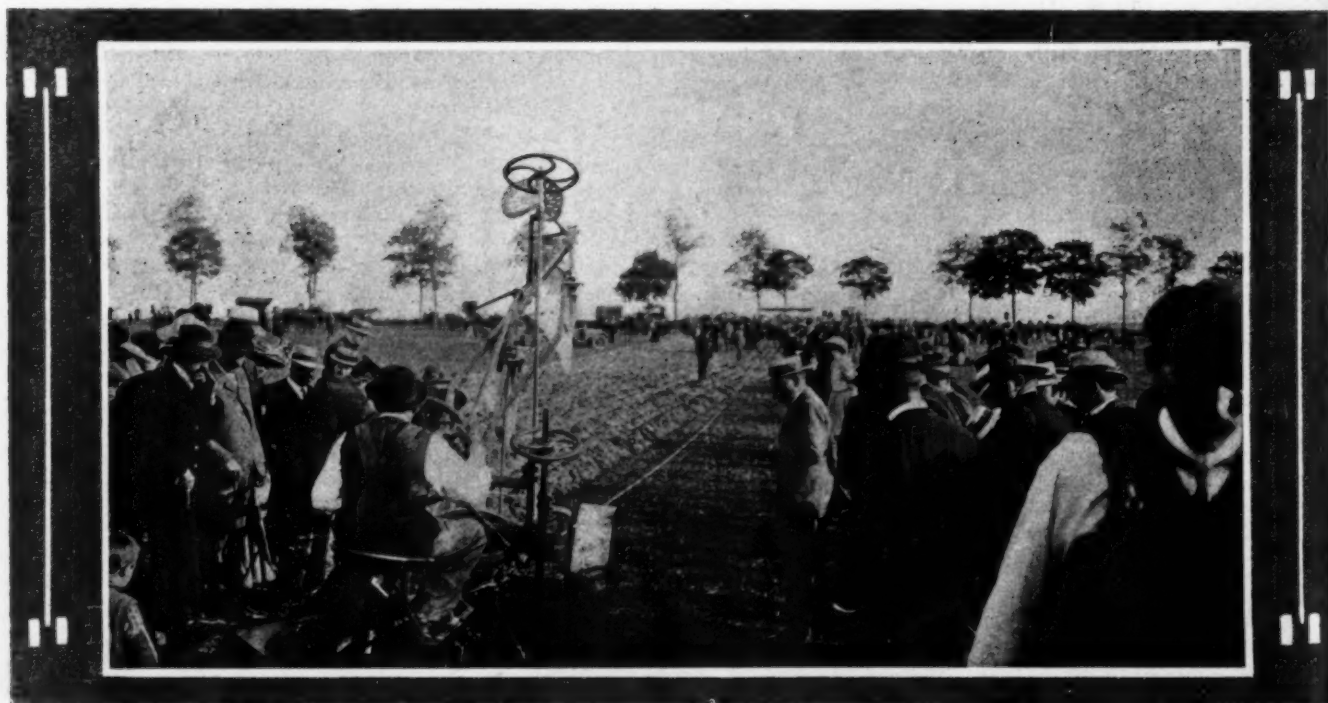
HAS AN EYE ON FUTURE BUSINESS

A Swiss hotel keeper, with the foresight that is characteristic of his race, has erected on the top of his garage a huge sign which reads as follows:

GARAGE

AEROPLANE STATION

The second line, which is intended to be easily deciphered from an elevation above the earth's surface, is addressed to prospective guests who may arrive by aeroplane or dirigible.



Bajac Plowing Machine at the Amiens Trials—Operated by Winding Drums at Each End of Field

By Stillman Taylor

AMONG the little things which occur with more or less frequency to vex the driver of the automobile, there are none more troublesome than misfiring. Misfiring, or the failure of some part of the ignition system to perform its regular functions, may be caused by a number of things, many of which are likely to be overlooked owing to their apparent insignificance. When misfiring occurs, the autoist very naturally concludes that the fault lies in the ignition system, and as this is the most complicated and delicate part of the whole car, the supposition is often correct. Yet it often happens, however, that the carbureting apparatus is the real offender, and if the complete electrical plant has been systematically examined throughout and the trouble still exists, it is reasonable to presume that the trouble is in the fuel supply system.

Among the causes which contribute to misfiring may be mentioned ignition troubles, such as short-circuit in wires, exhausted battery, pitted or improperly adjusted vibrators of the coil, sooty or cracked plugs, loose connections or switch, dirty timer or commutator, punctured condenser, moisture in coil, wet wires or cables, water on distributing plate, dirt on contacts in distributor or wear there, or dirt or wear in timer.

Carburetion and Fuel—Faulty mixture, sediment or water in the carbureter, clogged gasoline strainer, leaky float, clogged spraying nozzle, bent float-valve spindle, stale gasoline, partial stoppage of fuel supply pipe, hole or obstruction in intake pipe or manifold. These are not all the things that might happen, but are the principal ones which the writer's experience has suggested as most likely to occur to cars in general. We will take them up in their proper order of classification, first dealing with those failures attributed to ignition, followed with a list of carbureter and mixture troubles likely to produce kindred results, and so cause misfiring.

Troublesome Short Circuits—Either a partial or a considerable leakage of the electrical current may be due to worn or frayed insulation, and the bare wire may possibly come in contact with some metal part, and so form the short-circuit to the ground. This may or may not prove a constant short-circuit, as it sometimes happens that the vibration of the car will cause the bare wire to shift about, and the "short" will occur only now and then, as the wire brushes against the metal at intervals. Trouble of this kind is generally due to poor and old-time connections, and will but seldom occur with modern terminals. Perhaps the easiest and best way of correcting this trouble is to wrap a little tape around both the ends of the damaged cable and its binding post, which will keep the loose ends together and at the same time make certain of a good contact at the post.

Failures of the spark plugs due to defects in material and manufacture are not so common nowadays as in the past, but modern plugs are by no means immune from trouble. It is well to test the plugs in the event that trouble is suspected. To do this it should be first ascertained which of the cylinders is misfiring by holding down all the vibrators but the one to be tested. This is inconvenient without assistance, but the vibrators may be cut out of action by simply inserting a bit of stout paper between the platinum contacts. When the missing cylinder is found, unscrew and examine its plug, and if the points are clean and everything looks all right, connect up the high-tension wire, lay the plug on the cylinder, and turn the motor over until the proper contact is made. In case no spark is forthcoming and the plug is clean and to all appearances in good condition, it is very probable that the porcelain has developed a crack sufficient

to form a leak and cause a troublesome and elusive "short."

The reader should remember that this method of testing a plug is not infallible, since a minute crack in the insulation (not always visible to the eye) may not interfere with the production of a good spark in the air, but will cause leakage and so make a weak spark, or none at all, when called upon to overcome the greater resistance of the compressed gas. The electric current will always follow the path of least resistance, and as it is called upon to overcome considerable resistance in jumping between the two electrodes of the plug, it is obvious that a comparatively small defect in the insulation will prevent the production of a fat spark at the points.

Broken and wet wires are occasionally the source of misfiring, and although little trouble may be anticipated from the well made modern cables, the wiring of older cars—so largely seen in second-hand shops—is frequently defective. The writer has had some little experience in "tinkering up" these old sleds, and several times traced misfiring in the ignition system to a broken wire in the primary circuit. Where the wiring bears unmistakable evidence of having seen better days, the only satisfactory remedy is to put in new wiring throughout the car.

Wet wires are likewise the cause of considerable trouble in the older cars, as in many instances the high-tension cables are carried underneath the flooring and, being unprotected, are likely to get short-circuited through the water and mud splashed up by the wheels. In cases of this kind, the writer has often found it desirable to re-wire the entire system when possible. In some cars, where this is not convenient, an old length of rubber hose may be pressed into service to enclose and partly protect the otherwise completely exposed wires.

Worn and Pitted Contact Points—The platinum contact points of the tremblers of the coil should not be allowed to become pitted and uneven through neglect. If not properly attended to, the points will become rough and jagged and the poor contact will result in misfiring. The points should be examined occasionally, and, if uneven, they should be trimmed flat with a fine jeweler's or manicurist's file. The adjustment of the vibrator screw also plays an important part, and should be given its share of attention. A stiff tension is never necessary or desirable, as it will not only consume a greater amount of current, but will result in rapid wear and pitting of the contacts. The trembler should be adjusted with only sufficient tension to cause it to vibrate at a moderately high pitched buzz. This adjustment by ear rests altogether with the experience and judgment of the driver, which may or may not be good.

When the unit coil system is used—and this arrangement is now in general use—it is important for the best coil service that the vibrators of the several units be tuned as near alike as possible. This may be closely approximated by sound, but the only sure method is to measure the consumption of the current by means of a special ammeter. The exact amperage varies somewhat in different coils (from $\frac{1}{2}$ to $\frac{3}{4}$ amperes) and to obtain maximum efficiency the maker's directions should be followed.

Exhausted Battery—A rundown battery is a very common source of misfiring, and although the symptoms are plainly apparent in troubles of this kind, the difficulty is not always traced to the proper cause. The fact that a weak battery will not generally prevent starting, and only misfires after the car is well under way, is, no doubt, the reason why the real trouble is not at once suspected. And again, the motor may run fairly well at medium speeds, but when the throttle is opened to admit more

gas, the spark is too weak to fire the heavier charge, and the motor commences to misfire, finally coming to a stop. In fact, when the battery fails to respond to the spark advance lever it may be taken as pretty good evidence that the voltage is too low, and a new set of dry cells should be connected up, or the battery re-charged if of the accumulator type.

If the two sets of dry cells are used, they may be made to give some little additional service by connecting up its series (carbon to zinc). If two storage cells furnish the ignition current, connect them up in parallel (carbon to carbon and zinc to zinc). To avoid the annoyance of a weak battery, each dry cell should be occasionally tested for amperage and the defective cell renewed. A storage cell should be charged regularly once a month, and should never be allowed to become discharged.

Switches occasionally work loose, and, while an uncommon source of misfiring, it will occur now and then. A loose switch generally provides such poor contact that the motor will stop completely, but it may also cause missing in but one or two of the four cylinders.

The timer or commutator should be washed out thoroughly with gasoline at least once a week, to remove dust or other substance which will likely interfere with a perfect contact. If neglected, and dust and oil allowed to accumulate, the contacts will be imperfectly made and the current being poorly distributed, misfiring will ensue.

Condenser and Short-Circuit in Coil—The condenser is not likely to cause trouble, and the most serious injury likely to befall this important part of the spark coil is a puncture caused by the use of a battery generating a higher pressure (voltage) than the coil will stand. In this case the coil must be sent to the makers for repair. It occasionally happens, however, that misfiring results from a broken connection to the condenser, or is due to the presence of dust or oil on the spring contacts. If trouble is suspected in the condenser, the contacts should be examined and cleaned with a bit of cloth wet with gasoline.

Water or Moisture in the Coil—Will form a short-circuit and produce missing in the cylinder, and will rapidly exhaust the battery current. A primary or single wound coil—such as is used in low-tension make-and-break ignition—may be dried out, but the only way to fix up the high-tension coil is to send it to the manufacturers.

In addition to those misfiring troubles which have just been mentioned, many of which are common to both magneto and battery systems, there are a few misfiring troubles which are confined to the magneto itself. Owing to the fact that many autoists regard the magneto as a balky and mysterious machine, the reader may possibly find some meat in this somewhat desultory summary of the writer's experiences.

Perhaps one of the most common causes of magneto misfiring is due to the interrupter-contact-arm roller becoming worn. A fiber roller will often wear unevenly, causing the cam to slip over the worn flat spot without making a good contact. In case of steel rollers and fiber cams, the latter will sooner or later show signs of wear. The contact interrupter spring is also a common source of missing, as the spring loses its elasticity and becomes weak through constant use. Loose interrupter contacts are not quite so common, but will occasionally cause misfiring by working loose and so provide insufficient surface to insure a good contact.

Armature bearings work loose in course of time and cause misfiring by making too short a contact. Dust on the insulated face of the distributor is likewise conducive to missing, and the autoist should make it a point to keep this surface clean.

Carbureter and Mixture Troubles—Foremost among the several difficulties which may be called common misfires, is the lack of a proper mixture. A rich mixture containing a relative large proportion of gasoline in proportion to air is never desirable, inasmuch as it deposits considerable soot upon the piston, cylinder walls, and valves, and is, moreover, a waste of fuel. The motor will seldom run well on a rich mixture, and the carbureter should be so adjusted that no more gasoline is fed to the

mixing chamber than is sufficient for the motor to develop its full power. The exact mixture may be found by experiment.

A very rich mixture will cause misfiring; the motor will have a tendency to choke at other than high speeds, and is likely to overheat. A lean or thin mixture will, on the other hand, lower the efficiency of the motor, and it will have a marked tendency to miss at high speeds, accompanied by a popping sound in the carbureter. This is due to a weak mixture, and the needle valve should be adjusted to admit more gasoline, or if due to an excessive supply of air, the auxiliary air-valve should be adjusted to admit less air.

Bent Float Spindle and Leaky Float—Either one of these will cause missing in one or more cylinders. The float spindle may become bent or it may become jammed into its seat by too vigorous priming. This may be discovered by unscrewing the cover and lifting out the float. Considerable care should be taken in straightening out a bent spindle, and the metal should be placed upon a block of hardwood, another block interposed, and the spindle gently tapped with a hammer.

A leaking metal float or a fuel-logged cork will cause missing owing to its uncertain and erratic action. A cork float should be thoroughly dried out and then given a couple of coats of shellac to prevent it from absorbing the gasoline. As a new float is not at all expensive, the reader will probably find it more convenient to put in a new one. A metal float must be soldered when it leaks, and as the copper is thin and easily damaged, only a very little solder need be used. Precaution should be taken to keep the hot soldering bit away from the metal.

A clogged gasoline strainer is often the cause of trouble, and this is about the first thing that the autoist should examine when the misfiring is apparently in the fuel supply system. The brass gauze strainer should be frequently taken out and cleaned of any dirt that may have been filtered out of the gasoline.

An Obstructed Spraying Nozzle—Owing to the small needle-like opening in the spraying jet, it is not uncommon for a particle of grit to lodge in the orifice and partially stop the flow of gasoline. The obstruction will not always interfere with starting, but as soon as the motor speeds up the amount of gasoline sucked through the nozzle will not be sufficient for the motor at higher speeds, and it will soon begin to misfire until the motor slows down to first speed. A leak in the intake manifold will cause misfiring in one or two cylinders, and is often mistaken for ignition trouble. The cause may be due to loosening up of the bolts securing the flange to the cylinder.

The inlet valve is often the seat of the trouble, and missing here is generally caused by a weak or broken spring, a bent stem, or a carbonized valve. If the valve spring has lost its temper and broken down, the tension will be insufficient to properly hold the valve on its seat and the gas will partially escape and so cause missing. The insertion of an iron washer or two will increase the tension of the defective spring and serve as a temporary road repair.

A broken spring may be similarly repaired by placing a washer between the broken ends. A bent valve stem should be taken out and carefully straightened by laying it upon a billet of wood with another block interposed between it and the hammer. Only a very little force is needed, and the stem should be repeatedly tried until it slides freely in its guide.

Oil on Garage Floors—As an indication of carelessness on the owner's part, nothing is quite as effective as a neat little puddle of oil in the mathematical center of the floor, directly underneath the car. When it becomes necessary to lie down under the car to repair or adjust some part, this cunning little puddle of lubricant helps a lot toward the comfort of the man doing the work. The method of fixing this in the public garage is well worth copying (?). When a pool of oil collects on the floor there, the preferred way of fixing it is to sprinkle sawdust over it. The oil-soaked sawdust pile will make a fine starting point for a fire as soon as some thoughtful friend supplies the match necessary to start it.

DIRECT FUEL INJECTION TWO-CYCLE MOTORS

By THOS. J. FAY.

DIRECT fuel injection, as an adjunct to two-cycle motors, represents one of the most promising features, and designers of acumen recognize the possibilities. If the fuel is induced into the crankcase with the air, the mixture, if the crankcase compression is maximum, becomes combustible, and with the usual arrangement of ports it is extremely difficult to (always) prevent crankcase shots. The prime source of this class of trouble is due to having fixed ports with the inlet and exhaust simultaneously open coupled with a variable terminal pressure. If the terminal pressure is for any reason unusually high, some of the products of combustion in a flaming state will enter the crankcase with the usual consequence, *i. e.*, a crankcase shot, so called.

If the fuel is directly injected, which is a matter of providing a suitable injector and placing it in direct communication with the cylinders of the motor, the crankcase compression will then reduce to the compression of pure air, which, being non-explosive, crankcase shots will be eliminated even though flaming products of combustion may still enter the crankcase.

If the air in the crankcase does become contaminated (fouled) it is not such a serious matter under the conditions of direct injection of fuel, since the compression in the cylinder may be established at a point so high that preignition would be assured were the fuel mixed with the air too early. By timing the fuel injection so that combustion will be propitious, the compression may be just as high as mechanical considerations will allow of.

Products of Combustion Will Not Defeat Power—That contaminated mixture can be utilized even advantageously is shown by the story of nitrogen in the mixture, which represents 11.8 out of 15.3 pounds of atmospheric air, as required to induce complete combustion of one pound of gasoline. In other words, all fuel is encumbered with a large proportion of inert gas, and this is the reason why it can be used. The compression must be regulated to suit the dilution of the fuel with inert gas. Products of combustion must be classed with nitrogen (as an inert gas) with the exception that they are superior to nitrogen for the purpose, due to the presence of a little fuel value in the products (which is not so with nitrogen) and to the further fact that the products of combustion are in a heated condition, which in itself is of more than a little advantage when account is taken of the specific heat of gas mixtures, ranging as it does between 0.20 and 0.24.

Correct Mixtures by Adjusting Fuel—If a certain proportion of fuel under certain conditions of compression, will induce satisfactory results, then, within certain limits, other proportions of fuel, under other conditions of compression, will be followed by substantially equivalent results. True, the amount of oxygen in proportion to fuel present must be adequate to propagate flame, but this is a limitation which may be readily realized even when a considerable percentage of spent gas is present, provided the compression is adequately in-

creased, with one other proviso, *i. e.*, the fuel and the gases must be thoroughly intermingled to prevent stratifying.

If the fuel is projected into the gas body, as it will be when a suitable fuel injector is employed for the purpose, the mixture will not stratify, since the force of the sprayer will be spent in the process of distributing the minute globules of fuel to all parts of the gas body. In the presence of a suitably high compression the fuel (in view of considerable excess heat) will be rendered volatile at a high rate of speed and the logical conclusion is that two-cycle motors become at once practical under the conditions as follows:

(A) With a crankcase compression of from 5 to 7 1-2 pounds per square inch limited to atmospheric air, provided the transfer ports are suitably waterjacketed, free from undue bends, short and of adequate area.

(B) If the cylinder compression is so high that the rate of flame propagation will be adjusted properly despite the lack of complete scavenging.

(C) If preignition is aborted, which is a matter of timing the fuel injection.

(D) If the fuel injector is so contrived that it will project a spray of fuel into the compressed body of air, etc., in such a way as to cause the fuel to volatilize quickly and defeat stratification.

(E) When the cylinders are maintained at a working temperature, which is a matter of properly jacketing and circulating a cooling liquid, as water, at a sufficiently rapid rate, with the understanding that the heat will be sponged out of the water as fast as it is taken away from the cylinder walls, through the use of a radiator of adequate capacity to absorb heat.

Commercial Examples Show Results—Fig. 1 depicts a motor of the two-cycle class, in which the fuel is injected in the stream of air as it rushes through the orifice of the transfer port from the crankcase. The fuel enters the injector at A, passes into the body B and is fed out through the supply pipe C to the nozzle D, which lies in the stream of inrushing air from the crankcase, which in turn enters the cylinder through the transfer port E which is short.

Atmospheric air enters the crankcase through the orifice F by the automatic valve G into the chamber H, where initial compression takes place, due to the displacement of the descending piston I in obedience to the stroke of the crank J interconnected by the connecting rod K. Compression takes place when the piston I ascends. On the down stroke following compression the charge, having been ignited at the proper time (just before the completion of the compression stroke) delivers up its energy and just before the end of the stroke the exhaust L is uncovered (in advance of the induction port) at the termination of the induction port E. Due to early opening of the exhaust port L, the exhaust rushes out at a sufficient rate to reduce the terminal pressure below the crankcase compression, so that when the induction port is uncovered the compressed air from the

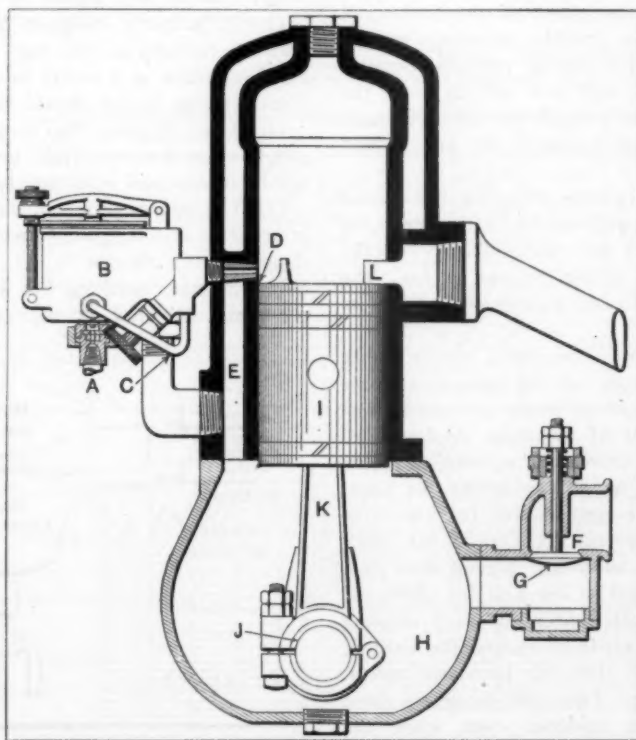


Fig. 1—Type of two-cycle motor with direct fuel injection

crankcase (picking up gasoline en route) is enabled to enter the cylinder in proportion as the exhaust products pass out.

The two-cycle relation is established since the action is such that a power stroke is induced for each complete revolution of the crank in each cylinder of the motor following the action as above indicated and a more continuous torque results.

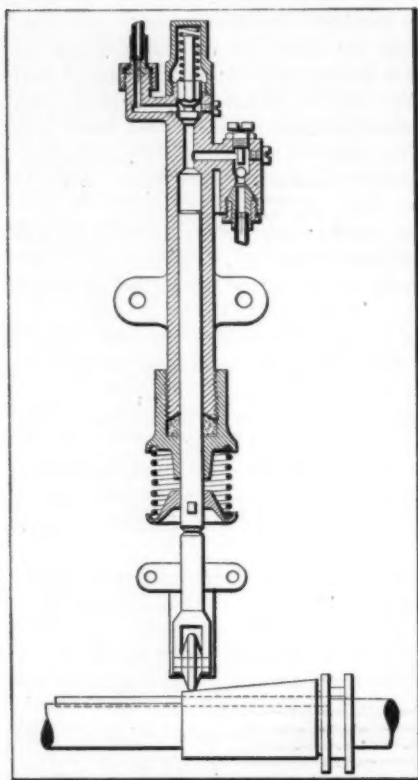


Fig. 2—Fuel pump showing sliding cam contrived to alter the stroke of the plunger at will

In this motor the fuel is well mingled with the air, because it is forced in as a spray at the throat of the transfer port on the induction side, due to good crankcase compression.

When a Timed Fuel Injector Is Used—There is further ground for experimenting, as when a timed fuel injector is employed, the difference being that the fuel will then be injected just before ignition with an interval of time sufficient to assure that the fuel will vaporize and mingle with the compressed air in such a way as to bring each molecule of oxygen in contact with its quota of hydrogen or carbon. Fig. 2 depicts just such an injector, and mechanically there are several ways of adjusting for time

of injection, one of which, the sliding cam, as shown, seems to be the more simple.

The main reason for discussing this phase of the fuel-injection problem is to keep in mind the possible advantage attending the increase in compression which will be rendered possible if preignition is entirely eliminated, and this will be so if the fuel is timed so that it does ignite without the aid of a spark it may be timed so that it will do useful work just as it would were the spark effective.

There is one other (possible) advantage attending the use of an adjustable pump, *i. e.*, the fuel will not be in the incoming crankcase charge, so that if some of this charge should "sneak" out with the exhaust it will not be at the expense of fuel; the fuel would be injected after the exhaust port closes on the up stroke of the piston.

It is not to be supposed that in a two-cycle motor (with given piston displacement) the mixture can be made so efficient for the purpose that the same amount of power per stroke will be realized as in a four-cycle motor of the same displacement. Were it possible to render the conditions of scavenging equal in both cases, then, and then only, would the strokes be equal as respects power delivered. In two-cycle motors the aim is to afford a rapid series of twisting moments and depend for result upon doubling the number of such moments, hoping that each power increment will be at least equal to one-half the ability of a single twisting effort in a four-cycle motor. If each twisting effort in a two-cycle motor can be made to exceed the turning moment unit in a four-cycle motor, then the two-cycle motor, size for size, will deliver more power. Two-cycle designers claim that this advantageous state is in evidence even when the two-cycle motor is designed in the most simple way.

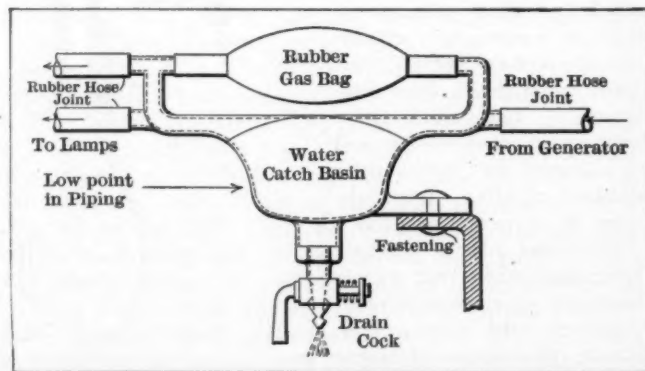
LIGHTING EQUIPMENT DEMANDS ATTENTION

Much has been said about the ability of acetylene generators, and true to the story, they are of very excellent characteristics, taking them as a whole. There are one or two small matters, however, which do not always receive the maximum of attention even at the hands of builders of cars when they furnish generators. It is not uncommon to note that the generators are installed without a gas bag to take the fluctuations, and in the absence of the same, the light flickers. After a time if there is no water trap the presence of excess water in the piping leads to the same trouble and it is even possible to find cars in which no attempt is made to drain the water to a low point. The device here illustrated shows how this matter might be disposed of, although the principle may be incorporated in without going to the mass of detail as presented.

The piping should be well installed, and to place the same in a protected position would seem to be well worth while. The copper piping frequently used is both small and thin of walls, and unless it is annealed it is prone to fail in service. Any autoist who finds that the piping is brittle, which is a sure sign that it has not been annealed, may readily perform the operation by simply heating the pipe after it has been coiled up to render it easy to handle, and when it approaches a clear red quench it in water. Steel is rendered hard by quenching, but copper follows a reversal of the law, and is rendered soft.

Oil Lamps Must also Be Cared For—The following observations apply directly to oil-lamp equipment, they being somewhat revamped to suit automobile conditions, otherwise they are very old indeed:

- (a) Keep the lamps scrupulously clean; this is one of the most important details.
 - (b) Select wicks that are the right size for the lamps; they should be a snug fit in the wickholder.
 - (c) The wicks should be just long enough to reach the bottom of the oil well and no more.
 - (d) The wicks should not be too tightly plaited; soft wicks will best serve the purpose, and when they get hard they should be discarded.
 - (e) New wicks should be dried out before they are put in the lamps.
 - (f) Before lighting, the wicks should be dipped in the oil.
 - (g) The oil well should be kept full of kerosene.
 - (h) In properly designed lamps the wick should pass to the bottom, inclosed all the way by the wickholder or some other suitable means as a safety device and to keep the wick in place. The inclosing holder should be open at the bottom.
 - (i) After lighting the lamp, turn the wick down and then slowly raise it to the right height. The exact right height cannot be determined until the lamp warms up.
 - (j) The oil can in which the kerosene is kept should be closed in order to shut out water, which oil will absorb to a vast extent if opportunity affords.
- In this state anything but a good light will be given off, and the lamps will snuff out readily.



Scheme for Holding Gas Bag and for Draining Piping System

Specially Ruled Paper on Which the Timing Device's Record Is Made

VARYING COMPRESSION

Editor THE AUTOMOBILE:

[2,046]—I have a compressor with a maximum hand for testing compression in cylinders of my six-cylinder car, $4\frac{1}{4} \times 4\frac{1}{4}$. My six cylinders register as follows:

No. 4.....	58 lbs.
No. 6.....	58 lbs.
No. 5.....	60 lbs.
No. 2.....	60 lbs.
No. 3.....	48 lbs.
No. 1.....	82 lbs.

Now you will note that the compression in No. 1 registers nearly twice as high as No. 3, and, as far as I am able to judge, the piston rings and valves in both cylinders are equally tight. How would you account for the difference in compression, and do you think if all the cylinders were equally tight that the compression in each one should be as high as the highest, viz., 82? Also would the engine be more efficient if they were all as high as 82? I might say that if they were it would be very difficult to start the engine, as it is very hard now to start on No. 1.

AMATEUR.

Toronto, Can.

Such a large difference as your measuring device shows would lead one to question if it were right, since, as you say, the motor runs well. This latter would seem out of the question were existing differences as great as those between cylinders one and three above. So before going any further it would be well to have the instrument inspected and then make another trial as a check.

Granting that you find the instrument right, so that the figures given are reliable, it would seem as if the average pressure which the manufacturer intended to attain was 60 pounds. You will note in looking over the figures that, taking this as correct, but two cylinders, one and three, differ markedly from it. In fact, you could hardly expect to get and retain a closer agreement than that which cylinders 2, 4, 5 and 6 afford to this supposition.

Where the compression is high, as in the case of cylinder 1, some material will have to be removed from the piston head, combustion chamber walls, valve and valve caps, or some combination of two or more of them. In the ordinary case, the changing of the last is not advisable, so there remains but the piston, cylinder walls, or both. To reduce the piston head is the easiest, since it is done by taking out the offending piston, chucking it carefully in a lathe and turning off the required amount of metal. Figuring this out as carefully as possible, it appears as if the cylinder in question has over 8 cubic inches of space too little. That is, it lacks that much of being right for 60 pounds compression. This, based on a $4\frac{3}{4}$ -inch diameter of piston, would mean a vertical height of $15/32$ inch, nearly $1/2$ inch, which you could not machine off with safety. The best plan will be to caliper the piston and see how much it will stand. Then take off that amount and see what effect it has had upon the compression. Then, if more is required, the rest will have to be taken off of the top of the cylinder walls, a hard task at best.

If you really attempt to fix the cylinders it will be well to attend to cylinder No. 3 at the same time, since that is an ever-present source of lost power. Figures ap-



LETTERS INTERESTING

pear to show this too large by the amount of over $7\frac{1}{2}$ cubic inches, which is equivalent to $7/16$ -inch height by $4\frac{3}{4}$ -inch diameter. To remedy cylinder No. 3, then, you would add a plate to the piston head of the full diameter and $7/16$ -inch high, or, if the edges were tapered off, the height would have to be increased to correspond. In this latter case, see the article, "Ingenuity in the Making of Repairs," on pages 353, 354 and 355 of the August 26 issue of THE AUTOMOBILE. Upon the last page of this in particular is described the method of adding to the head of a piston, although the article is written from the standpoint of repairing a broken piston head.

The compression must be equal in all six cylinders, else the lessened amount of power developed in the one with lower compression will prove a drag upon the others. Similarly, increased power from any one would destroy the balance, which the six-cylinder is noted for, and which is the real reason for using it. If you are doubtful about your ability to fix it, or that of the nearest repair shop, communicate with the manufacturer of the car.

TO CURE BALKY STARTER

Editor THE AUTOMOBILE:

[2,047]—We have a ***** 1907 automobile that is very hard to start at first. After it has been started and has run five or ten minutes it is easy to start, if stopped. After it has run for a couple of hours it is awfully hard to start. The spark is good and we cannot adjust the carburetor so as to improve the starting. HAYNES & SON.
Newkirk, Okla.

It is foolish to continue to crank a motor for five or six turns. In medium weather the modern engine should start on the first, or, at most, the second turn of the crank. If it does not do so, something is at fault, and should be corrected before cranking again. If the carburetor is adjusted perfectly and still the engine won't start, you should overhaul the ignition and wiring for something wrong. Look particularly for loose terminals, wires with the insulation worn off in spots, and similar small and hard-to-find sources of trouble. It sounds a lot like the second, insulation worn off. Many times this happens and does no harm when standing still or running slowly, so that the vibration is small. On the other hand, when running fast or when the vibration is very great, the bare spot rubs against metal or other conductors, with the result a short circuit. When the car stops, the bare spot pulls away from the metal, and the car will start at the first turn of the crank. Look the car over carefully for some little hidden trouble like this.

STORAGE BATTERY QUERIES

Editor THE AUTOMOBILE:

[2,048]—Will you please answer the following questions for me?

1. Can a storage battery be charged from a magneto, and if so, how?
2. Can a storage battery be charged from any source of direct current without using any additional device?

New York City. PERCY HEINEMAN.

Both questions cannot be answered directly; that is, by means of a simple yes or no, although in the case of the second question we can come pretty near it.

As to the magneto, if it is of the ordinary rotating armature or rotating sleeve type, it will generate an alternating current. This cannot be used to charge the battery without a commutating device, which will convert the current into a direct one. This may be done in a number of ways; in fact, it may be done upon the magneto itself. In other words, the magneto may be so constituted as to deliver direct current. In that case, it could be used, but much care would be necessary, as the plates of the battery could be buckled and spoiled by charging too fast. You will need a combination volt and ammeter for measuring the current, as otherwise you will not know how much current you are using and are liable to spoil the battery plates before you find it out.

The direct current may be used directly, but as brought out above it is dangerous, unless you have some means of cutting down the amount of current flowing, and some means of measuring the amount of current flowing as well. In this connection, you are referred to several excellent articles on this subject which have appeared from time to time in THE AUTOMOBILE, notably: "Operation and Care of Vehicle Batteries," August 12 issue; "New Nickel Iron Battery Withstands Tests," July 15 issue; "Pointers on the Care of Vehicle Batteries," May 20 issue; "Some Further Ignition Hints," May 27 issue; "Charging Storage Batteries," July 1 issue (letter).

Nearly every one of these excellent articles lays emphasis upon the care necessary in charging storage batteries, and the precautions which are necessary to attain proper results, and nearly every one of them, brings out the points brought out above, namely, that too rapid charging will destroy the valuable plates. That is to say, a peculiar and out-of-the-ordinary method of charging is to be discouraged, in that it might go wrong, and then you would be out the price of a new set of plates, in your particular case, the price of a new storage battery, a not-inconsiderable sum. The question arises, then, is this trying of a new method worth your while?

ANSWERED AND DISCUSSED



VACUUM AIRSHIP AGAIN

Editor THE AUTOMOBILE:

[2,049]—Your comments in the September 30 issue of "The Automobile," page 562, on the vacuum airship, which was described in the August number of "Machinery," are justifiable. We ask if you have seen the following article in the September number, page 39, by Professor Forrest E. Cardullo, which shows mathematically that no structure light enough to rise in the air (if the air were exhausted from its interior) could be made of known materials and withstand the pressure of the atmosphere.

Prof. Cardullo's demonstration gives a general formula that applies to all spheres, large or small. The fact that a sphere cannot be made to withstand the pressure of the atmosphere apparently demolishes the whole project, as surely a cigar-shaped vessel would not be as strong as a sphere.

We have endeavored to get Mr. McCready to publish details of the De Bausset design, but he has not complied, and we feel that the De Bausset claims are without sound foundation. FRED E. ROGERS, New York City. Editor "Machinery."

The article referred to should conclusively discredit the vacuum airship idea. Prof. Cardullo takes for the sake of convenience a sphere containing one pound of air. Such a sphere would be 2.93 feet in diameter. If the sphere itself is to weigh one pound, the thickness of its wall (made of steel weighing 480 pounds per cubic foot) will be about 0.0001 inch. The atmospheric pressure on it will be 14,270 pounds; the cross section of the shell will have an area of 0.1023 square inch, and therefore the compressive stress in this cross section will be 140,000 pounds per square inch.

Even more obvious is an illustration taken from Mr. McCready's own figures. The proposed airship was to be 150 feet in diameter and 750 feet long, and was to weigh 270 tons. Prof. Cardullo says: "If all this 270 tons were utilized as a 700-foot steel column, keeping the ends of the cylinder apart against atmospheric pressure, the stress in the column would be 163,000 pounds per square inch." He also disproves another theory which has long been upheld, namely, that the vacuum ship becomes more practicable as its dimensions are increased. Prof. Cardullo shows that the compressive stress in the wall will be independent of the diameter.

This should dispel for all time the old and well-worn vacuum "chestnut." Those interested are referred to the article.

LIST OF 1908 AUTOMOBILES

Editor THE AUTOMOBILE:

[2,050]—Have you on hand any publication giving a complete list of the 1908 models of American automobiles, with detailed description, price and illustrations of each? A. B. CRAFT.

Cranford, N. J.

Just the matter you want will be found in the November 28, 1907, issue of THE

AUTOMOBILE, on pages 792 to 796, inclusive.

This is the tabular story of the American cars for 1908, published in advance. The whole range of cars is covered, these being divided into four main classes, namely, gasoline pleasure cars, electric pleasure cars, gasoline commercial vehicles and electric commercial vehicles. The first named, in turn, is subdivided according to price classification into: cars costing less than \$1,000, costing from \$1,000 to \$2,000, costing from \$2,000 to \$3,000, costing from \$3,000 to \$4,000, costing from \$4,000 to \$5,000, costing from \$5,000 to \$6,000, costing \$6,000 up. This makes ten complete and separate lists, which include no less than 400 cars. As for illustrations, you will find a few in that and succeeding issues. We know of no other publication which will give you as good or as complete a list as this one.

PLATINUM POINTS BLACKEN

Editor THE AUTOMOBILE:

[2,051]—What is the cause of an induction coil on a two-cylinder automobile becoming blackened (apparently oxidized) on the platinum sparker at contact point? Three new points have been tried with the same result; when they become blackened the sparker fails to work unless it is taken out and polished, when it is all right for a few hours, then the polishing has to be repeated. The other coil never bothers in this way at all. T. NELSON & SONS. New York City.

This is a trouble which we have never heard of before, and are inclined to believe must have misled you. This is, the ordinary pitting of the platinum points of a coil is accompanied by more or less blackening of the metal. We are inclined to think that you have confused the real cause of the trouble (pitting) with one of the results (blackening). Some pitting is to be expected, and no method is known of absolutely preventing it but by having a proper adjustment of the points, so that too much current (and, consequently, heat, which means pitting) will not pass through the points. One way out of the trouble is to get a specially made two-cylinder coil, with but one trembler. This will reduce the platinum point trouble to a minimum, in that it gives but one point to be kept in good order. In polishing off corroded or pitted points, use the finest file obtainable or the very finest emery paper. In a recent issue you will find Nicholson's X F Number 6 Swiss file advocated as excellent for this. The use of even this, to say nothing of the heavier and coarser files, should have much care, from the viewpoint of the tremendously high value of platinum, even the small amount filed off having a value.

GARAGE FLOOR MATERIAL

Editor THE AUTOMOBILE:

[2,052]—In one of the early summer issues of "The Automobile" the address of a firm supplying a plastic material to be applied over old garage floors, to render them impervious to water, etc., was given. I cannot now find that number. Can you help me? H. G. A. Waterbury, Conn.

The substance to which you have reference is called Crown Sanitary Flooring. It is made in New York City, by Robert S. Keasbey Company, 102 N. Moore street. It was described in the July 15, 1909, issue of THE AUTOMOBILE. For the benefit of those who are interested in this material for garage use, and who missed that particular issue, a short description of it may not go amiss.

It is said to be an asbestos composition, and comes in the form of a paste. This may be applied to an old or new floor in any convenient manner, spread over in an even layer. The makers recommend a thickness of 1/2 inch in the ordinary case. Besides the advantage of being easily and quickly applied, it has the merit of being water, fire, and oil proof. It may be had in any desired color, from the method of laying it would have no seams, and similarly, when finished it will be practically indestructible. With this large number of features to recommend it, it should find wide use.

LIGHT STAND FOR GARAGES

Editor THE AUTOMOBILE:

[2,053]—Sometime during the summer I saw an article in "The Automobile" about a device for supporting electric lamps in the garage, in such a way that a chauffeur could work by them at night. It was a stand, and the lamps were hung on it in such a way that a person could move the stand anywhere. As I remember, it was quite light in weight. I cannot find the number of the paper in which it was described, and would like to have you let me know about it. R. M. BURNETT.

Southborough, Mass.

The article in question will be found in the July 1 issue of THE AUTOMOBILE, under the heading, "Saves Electric Light Bills." The stand is there described in full. It is there called the Portland Wash Rack Stand, which is a misnomer, for the right name is the Portable Wash Rack Stand. It is made and marketed by the Brown Company, Syracuse, N. Y. As you say, a device of this sort is very convenient in and around a garage. Its lightness, compactness and low price render it a valuable thing in any sort of a shop.

ATTENTION MANUFACTURERS

Editor THE AUTOMOBILE:

[2,054]—I would like to contribute a short article to your publication with a view toward attracting attention of automobile manufacturers to the advantage of establishing branch factories in the Southern States, where the demand for motor cars is beginning to assume prodigious proportions. The stimulation that has recently been given good road construction has had remarkable effect upon the motor industry, and it is but a question of a short time when all kinds of motor vehicles will be in great demand, from the gasoline plow to the high-priced and luxurious limousine.

It is not fair nor is it logical that a greater portion of fine grade cars should be con-

struited north of Mason and Dixon's line, for it forces the southern purchaser to go into his pockets for the enormous freight rates or charges that unjustly add so much to the initial cost of his car.

We should have home factories to supply the home trade, and it is up to the progressive motor car builder to realize that the first on the ground in this promising, and well nigh virgin field, will reap the greatest harvest. The southern people are clannish and are loyal to "home industries," and would greatly prefer purchasing a high-grade car of home make to one built in another section of the country, especially so when they keep the \$25 to \$100 in their pockets that they are now forced to pay the transportation companies before their motor car can be delivered.

Now it is well known that within this part of Georgia there can be found abundance of raw material for motor car construction, and thousands upon thousands of hydraulic horsepower, in the present form of small streams, flow through the richly timbered and ore-imbued hills of old Georgia, idly to the sea, that could be harnessed and made to furnish power for manufacturing enterprises at less than half the cost of artificial energy developed by costly boilers, engines and constantly increasing expensive coal.

Within this, Bartow County, Georgia, are found practically inexhaustible deposits of iron, manganese and asbestos. Beauxite also abounds, corundum, some lead and great quantities of the finest grade of yellow ochre. Hardwood timber of all kinds and pine of the best quality grows upon the hillsides.

I have no property to sell, nor have the slightest interest in any real estate or property of any description that could gain from the installation of an automobile plant in this section, but my patriotism for my city and county, and my desire to see the development of marvelous natural advantages, prompts me to make some effort to draw attention to the advantages to be found here by some progressive manufacturer.

The United States Government has a corps of surveyors now examining a site upon the Etowah River, four miles from this city, where between two gigantic bluffs a dam 190 feet high, which will develop more than 20,000 horsepower, will soon be built by Uncle Sam. This power will be for sale at low rates. The dam will back water over a length of 18 or 20 miles and will make an artificial lake that will rival in scenic beauty the famous Lake George, N. Y., and will make a new field for motor boats, as well as furnish a fine location for a factory for the construction of such pleasure craft.

It will be a big thing, and I would like to get it before the manufacturers, in order that they might investigate when they come to Georgia to attend the show and races during November in Atlanta.

S. P. JONES, JR.,
Advertising Committee,
Chamber of Commerce.

Cartersville, Ga.

SELF-STARTER INFORMATION

Editor THE AUTOMOBILE:

[2,055]—Will you kindly give me an article on the various schemes or contrivances for automatically starting gasoline engines or automobiles, the various methods employed, and the success or failure of the same? What were the reasons for any trouble that developed? I think that an article on this subject would be interesting to others as well as myself.

Nichols, Conn.

If you will turn back to Volume 20 of THE AUTOMOBILE, which you doubtless keep on file, you will find, in the April 1 issue, the very thing that you are looking for. This is an article entitled "Self-Starting Devices Attract Much Attention," and in so far as it was possible in three pages (542, 543 and 544) the whole subject of starters was covered. They divide naturally, as the article points out, into two classes, the mechanically operated and the fluid operated. In the former class are the strap, spring and similar devices, while under the latter head are grouped the compressed gas, compressed air, exhaust gas, and similar starters. You will find these described in the article mentioned.

RULE OF THE ROAD

Editor THE AUTOMOBILE:

[2,056]—Attached find photographic drawing explaining collision which occurred some two or three weeks ago.

The Green car coming up Broadway on the correct side of the road intended to turn into the Little Neck Road on a close turn (This is a notoriously bad turn). The Green car was traveling slowly on account of the chauffeur's knowledge on the bad turn and the condition of the road. The Yellow car was coming down Broadway in the center of the road. The Orange car was on the wrong side of the road, and seeing the Green car about to make the turn, applied his brakes. The chauffeur of the Green car also applied his brakes, but skidded into the Orange car, breaking a wheel on the latter. At this time the Blue car was in the center of Little Neck Road. The owner of the Orange car (which was on the wrong side of the road) sent a bill for damages to the chauffeur of the Green car. The latter had adhered to the rules of the road and kept to the right. Kindly state who is at fault.

COLLISION.

New York City.

Not being able to reproduce colors, it will be necessary to letter the cars. On the diagram of the two roads and the cars involved, as brought out above, everything is just as the original diagram showed, except that the green car has been marked A, the orange car B, the yellow car C and the blue car D.

Green car A was in the right, and therefore not to blame, and should not pay the damages asked. Orange car B, being in the wrong, should suffer whatever damages were inflicted as a penalty for not obeying the laws of the road. Yellow car C and blue car D have no actual connection with the case, as from your letter we take it that both of them were at some distance when the collision started and came up later on. They may, then, be eliminated from the case.

The proper method of procedure for orange B car would have been to slow down and apply brakes before actually reaching the turn and before he saw green car A. This was his necessity because he was in the wrong—"off side," to use a football term. In that case he would have had his car slowed down before he saw green car A, and as soon as he sighted the latter it would have been an easy matter to stop in time to avoid an accident.

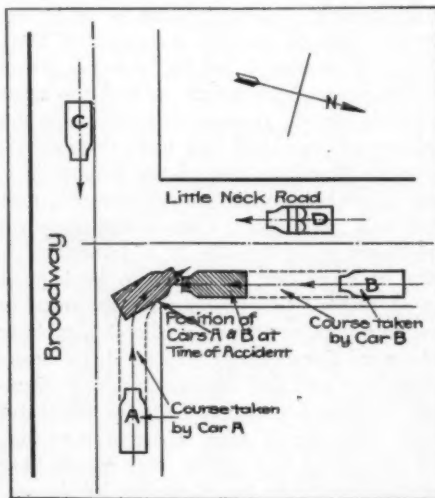


Diagram of Collision on Long Island

It is very plain that green car A was not at fault, and, as stated above, he should not pay any part of the damages incurred by another car which did not observe the law. The submitting of a bill by the latter was not at all surprising, as the road hog, who habitually uses the most convenient side of the road, regardless of others, is usually equally inconsiderate in laying the blame for an accident.

TO ELIMINATE KNOCKING

Editor THE AUTOMOBILE:

[2,057]—I have a suggestion for E. W. Kafer letter (2,037), whose mysterious knocking troubles are exploited in the Oct. 7 issue of "The Automobile." It is just barely possible that one of the valve tappet rods has become so worn in its guide that it has some side play; if this be the case, high motor speeds with well-opened throttle bring out the knock, as there is considerably greater pressure upon the valve, under such circumstances. This increased pressure resists the raising of the exhaust valve and therefore the tappet. The latter being urged by the cam, strikes the worn side of the guide a very hard blow in its endeavor to shirk its natural function. At least, this proved to be the solution of a very baffling knock in a car I owned, which, before I located it, caused me to tear down the motor completely five successive times only to find everything apparently beyond criticism.

K. R. MANVILLE.

New York City.

While the writer of the letter referred to in the above communication did not bring out the point that the trouble only disclosed itself at high speed, as Mr. Manville seems to think, the suggestion is a very good one, and Mr. Kafer's attention is called to it, as well as all motorists, who have, at one time or another, had trouble with a peculiar pounding which defied exact location, and which was omnipresent. It is the little troubles like this, which frequently pass by the notice of the shop or garage "expert," which every amateur is anxious to know. These little things cannot be "doped" out sitting in a comfortable office chair, but must come from actual, and sometimes painful, experience.

MAKE AND BREAK PLUGS

Editor THE AUTOMOBILE:

[2,058]—Will you kindly advise me where I can secure make and break spark plugs to work from a General Electric Company's magneto, made to use with make and break spark, that is, low tension. W. M. CASE.

Clarksville, Tenn.

By far the best way to obtain these plugs, if the makers of the magneto, the General Electric Company, Schenectady, N. Y., will not assist you, will be to go to companies now using, or which have used in the past this form of ignition. These companies will doubtless be glad to sell you an outfit, which you could use with a little adaptation. As a matter of fact, no such plugs have ever been manufactured for sale, each company using this system making its own plugs. Companies which now use or have used this system are: Locomobile Company of America, Bridgeport, Conn.; Gaeth Automobile Company, Cleveland; Studebaker Automobile Company, South Bend, Ind.; Ranier Company, Saginaw, Mich.



Fig. 1—Model D, regular \$485 car, equipped with oil lamps, tools, tire kit, etc., and ready to run

SOMETHING of a sensation was experienced when the Brush first came into being, primarily because the price was low, relatively, and novelty was written all over the car. That merit also was a comparison seems to be borne out by the last year's performance, of which there are now so many cars in use that it is extremely difficult to stand on any prominent corner in Detroit for ten minutes during the day and not see one go by.

Under the circumstances it would seem as if it will be well worth the undertaking to investigate the car at some pains and ascertain just how it is made and try to tell why the maker deems it expedient to enlarge the line and turn out a vast number of the cars during 1910.

The prime idea of the Brush Runabout Company, of Detroit, Mich., is to make a standard chassis which will be available for use under a great variety of conditions and Fig. 2, representing a coupé, shows up one of the uses to which the chassis may be put to excellent advantage. Among the other selections, of which there will be eight all told, model D is the regular car, which represents a runabout type, as shown in Fig. 1, at the very modest price of \$485. The remaining selections include a car with an ornamental tool box at the rear, another with a rumble seat and a third, in raceabout style, with an oval gasoline tank back of the seat of a capacity for a day's run.

The Brush from a Mechanical Point of View—The chassis frame is of wood, the reasons for which, according to the designer, is to afford lightness with strength and to attain a certain degree of flexibility and other qualities attributed to resilience. This is not a new idea, it being standard on such cars as Franklin, Panhard, etc.

The spring suspension is at variance with common practice, in that the chassis frame rests on helical springs placed just over the axles at the four points of suspension, and in order to induce a slow rate of vertical bounce following road

inequalities attended by speed of the car, the distance rods are terminated at the chassis frame for the front and hind axle at both sides in friction disk members, so contrived that the friction set-up, due to vertical motion of the axles, will be enough to assure that the travel of the body in the vertical direction will be gradually snubbed and the rate of change of motion will be that described as agreeable riding qualities.

Some earlier attempts to use helical springs for chassis suspensions failed to come up to the expectations of designers, primarily because the snubbing action of the friction members was not taken advantage of and the axles were very heavy indeed, considering the things to be accomplished. The Brush plan does not end with placing friction members to limit vertical bounce, for the axles are made of wood in order that they will not be heavy, although it is recognized that they must be strong.

At first thought it might be considered that axles of wood in an automobile is an innovation not to be taken seriously. Let us have another look. These axles weigh but a few pounds; regular live rear axles weigh nearly 200 pounds. The difference is the story of energy of impact and the influences of acceleration. Were the axles heavy, as they would have to be were they made of metal in the usual way, there is small chance that the friction members on the ends of the distance rods would be capable of snubbing the motion of the rapidly bouncing axle at high rates of road speed and with rough going.

By making the axles so that they weigh but little, the featherweight impact component is not enough to overcome the "damping" ability of the shock absorbers, and the body rides on an even platform even when the speed of the car is quite high and when road inequalities are pronounced. There is one point in favor of helical springs aside from the fact that they are practically unbreakable, and that is, they are capable of recovering at a more

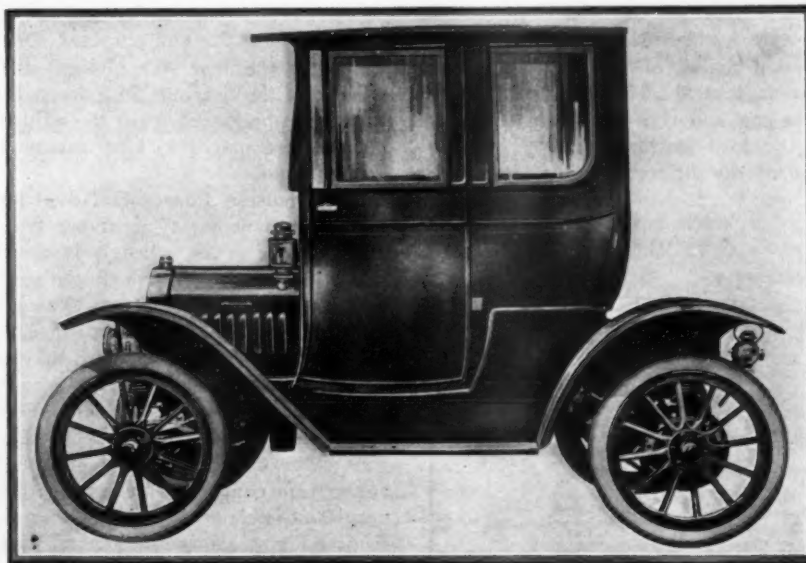


Fig. 2—Brush chassis, equipped with coupé body

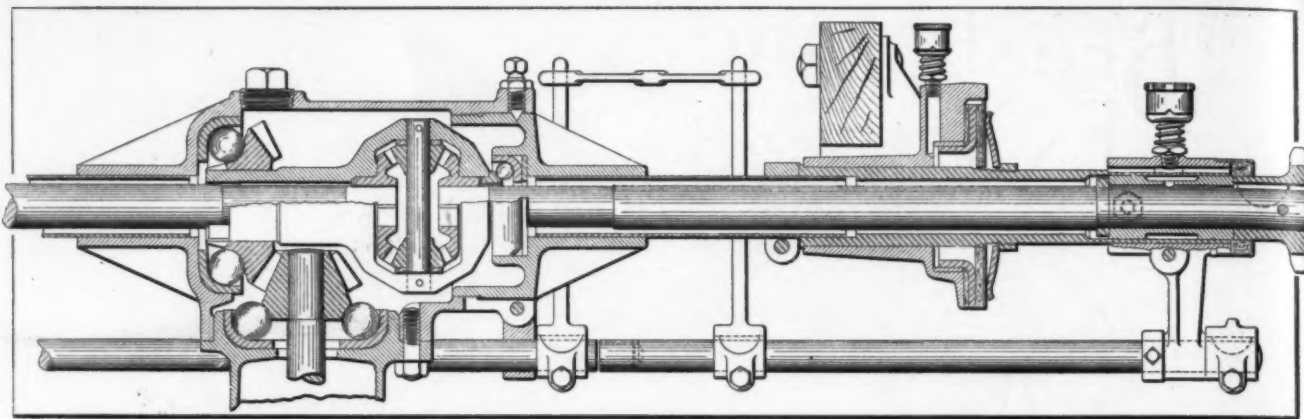


Fig. 3—Depicting jackshaft in section with differential and large ball bearings for the bevel drive

than usual rate when a wheel drops into a rut, and the general performance is very satisfactory, simply because the weight of axle is not enough to disturb the otherwise good relation. As to the strength of wooden axles, it is not necessary to go into detail; they were used in every wagon in the land before steel came into vogue, and the history of wagons does not disclose that they failed in any particular. Four thousand Brush cars add to this favorable historical fact, and this phase of the dis-

cussion may therefore be dismissed as being too trivial to warrant the taking of time and space.

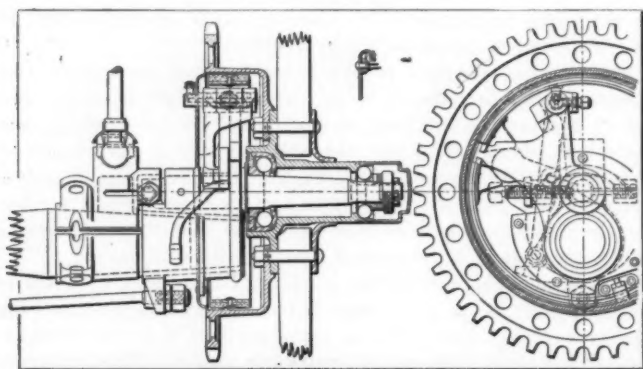


Fig. 4—Rear wheel, sprockets, brakedrum, showing ball bearings, and system of protection against silt of the road

Belongs to the Side Chain Drive Genera—Referring to Fig. 3, of the jackshaft, which is placed across the chassis frame in front of the hind axle a sufficient distance to allow of the required length of sprocket chains, of which two are used, placed as is the custom in cars in general. The differential gearset is shown in section and the cup and cone ball bearing to one side of the housing take the load at this point. The bevel drive also shows on the end of the differential sleeve, engaging

the driving pinion on the end of the propeller shaft, leading from the motor through the transmission gearset. The large ball bearings used to back up the bevel drive are excellent indications of the plan of the designer, and, as will be well appreciated, the larger the balls are the longer they will last under thrust and high-speed conditions, which is the reason for the large balls used. The material of which the bevel gears are made is that which will best stand cementation and the finished gears are capable of serving for ball races of competence as well as for the regular work of transmitting power.

The remaining features of the jackshaft will require no more than a glance to disclose the character of the design and workmanship, and grease cups are placed at all points for the customary purpose and with the further idea that as grease oozes out silt of the road will not be creeping in.

Fig. 4 is a section of the rear axle, showing how the sprockets are fastened to the rear wheels by engagement at the bolting of the hub flanges, using the regular hub bolts for holding, and the brake drums are integral with the sprocket wheels. The brake shoes are of adequate stiffness, remembering that they are of the internal expanding type and have to be stiff to properly work, while the facings are wide, of material which affords a high coefficient of friction, and the means of applying pressure show competence. The brakes are inclosed and the dust cover is so contrived that it serves its purpose admirably.

The distance rods fasten to the rear axle just under the spring perches as shown, and a ball and socket (universal) joint, using large diameter ball for the purpose, takes the work, eliminates noise and may be adjusted at will. The wheels are fitted with 28 x 3 1-2-inch pneumatics and the cup and cone ball bearings are even large for the purpose. One other point before departing from the rear axle design; the means for adjusting the wheels to the bearings includes a large hub nut, castellated so that it can be locked when the adjustment is properly made, and closures are placed to keep grease in the cavity as well as to keep silt out.

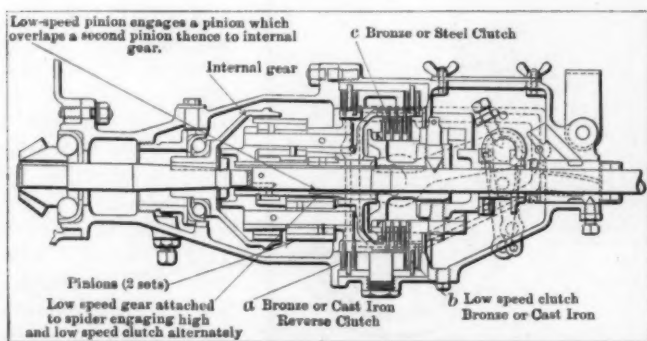


Fig. 5—Planetary gear set, showing multiple disc clutches, system of gears, and screw system of engaging the high speed

Transmission Possesses Novel Features—The transmission is of the planetary type, giving two speeds and reverse. Like all planetary gears, when it is desired to go at high speed a clutch is interposed to lock the gears so that the whole nest rotates and the drive is that known as "direct on high"; to go into low, or reverse, the usual custom is to hold the drum by means of friction bands, which may be tightened at will. In the Brush multiple disk clutching members are used in the three cases, bands are eliminated and the ability of the low and reverse clutches is equal to the requirements as measured in this way. The clutch for the high speed (direct on high) differs again from clutches in general in that the means of engaging is novel and is claimed to possess certain specific advantages. The section Fig. 5 shows the general arrangement, in which will be found the high-speed clutch, consisting of disks resting between vise-like jaws, one of which is formed out of the spider and

the other is in concentric relation, sufficiently spaced in the axle plane to afford room for the disks plus clearance when the clutch is not engaged.

When it is desired to engage the high-speed clutch, movement of the lever results in the closing of the vise on the disks, as follows: Through the compound action of a screw, which is thrown into engagement by the lever system, the original effort of the operator is added to by the torque of the screw, transposing the torque of the motor. All the operator has to do is to make the initial effort and the pressure resulting is enough to bring the screw into action, when the torque of the motor will wind up the screw and tighten the clutch, all without the use of a heavy spring and at the expense of a minimum effort on the part of the operator, while, at the same time, the engagement is not only gradual, but positive.

The screw effect is brought about by so shaping the metal sleeve so that rollers, which protrude into spiral slots in the sleeve, will screw the sleeve into engagement once the initial motion is imparted by the operator. In disengaging the clutch the reverse action follows and the disengagement is positive and quick.

The planetary, as shown, belongs to the internal gear type, is therefore free from noise when well made, and the low-speed pinion on the shaft, when going into reverse, transmits its motion through overlapping, intermediates, of which there are two pairs, thus making the mechanical balance perfect and assuring adequacy of mechanical ability without having to use large members attended by noise, inertia effects, etc.

The low-speed gear which is attached to a spider is free to engage either the high or low-speed clutch at will, thus perfecting the device for the purpose. The whole system is properly inclosed, may be packed with grease, is so simple to operate that skill is not required and to make a wrong move is quite out of the question, even in the absence of knowledge.

Novelty Resides in the Motor—The single-cylinder motor is rated at 10 horsepower and is of the vertical type placed in front, as in foreign practice. The power of the motor is greater by 3 horsepower than that of the last year's product, not so much due to any very great demand, but, as the designer put it, so that drivers will feel the excess and worry will then be out of a job. The cylinder is of the L type, as depicted in Fig. 6, and among the advantages symmetry has a claim. The head is screwed in against a bevel seat, is rendered tight by the pressure of the head cover against the seat and is readily removed at will if it becomes necessary to clean out the combustion chamber space, as when carbon forms. The valves are large, press against bevel seats, are properly water-jacketed, and, by means of adjustments at the terminals of the tappets, timing may be accomplished to a nicety at any time.

The crankshaft, as shown in Fig. 8, is of 40 points carbon open-hearth steel, stout of section and balanced. Even when

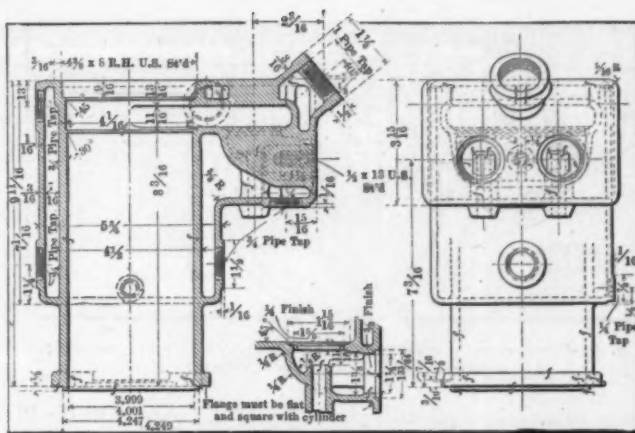


Fig. 6—Cylinder of gray iron, with screwed in head, bevel seat to make it tight, and valves at one side

balanced to a nicety a crankshaft in a single-cylinder motor cannot be free from unbalanced secondary moments, and it is in this particular that the 1910 Brush offers a new innovation. Fig. 7 shows a balanced gear which meshes with a gear of the same diameter on the crankshaft. The balance weight in the gear Fig. 7, in a plane parallel to the balance weight on the

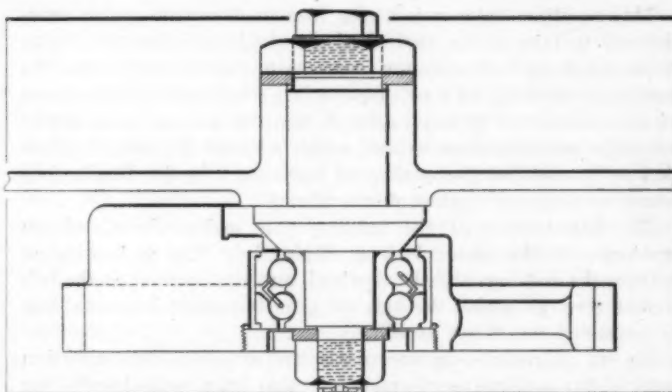


Fig. 7—Auxiliary balance gear showing New Departure ball bearing and eccentric spindle with adjusting nut outside

crankshaft, and since the crankshaft balance takes care of all unequal rotary moments plus one-half of the unbalanced secondary moments, it remains for the auxiliary balance (balanced gear) to cope with the remaining unbalanced secondary moments.

The secondary balance rotates on an axis above the axis of the crankshaft a distance sufficient to compensate for angularity of the connecting rod, and while it is not claimed that this sec-

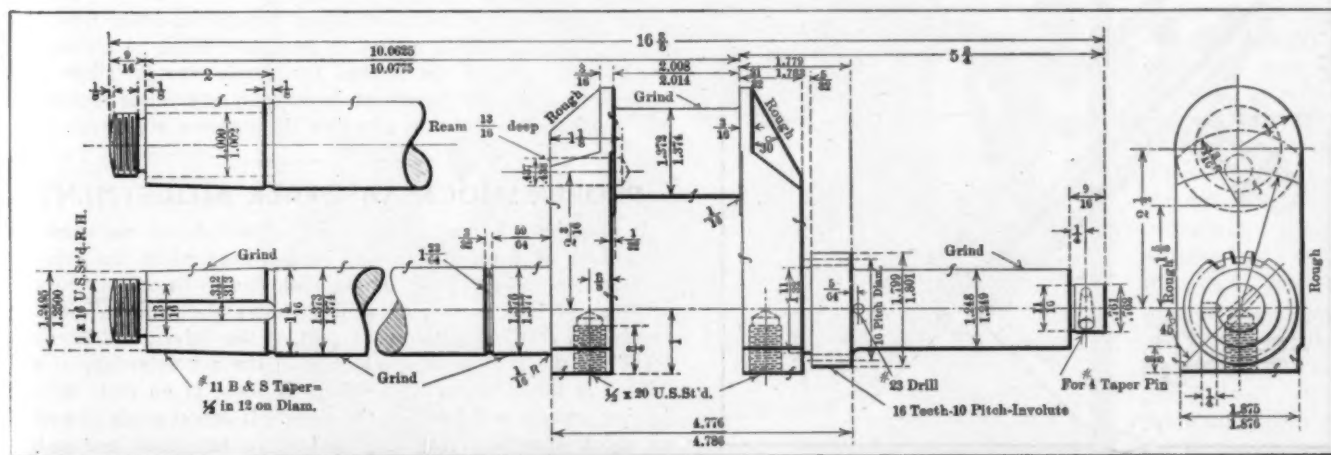


Fig. 8—Crankshaft of 40-point carbon open hearth steel, with liberal bearings surfaces, stout arms and means of direct and auxiliary balancing by thorough use of an auxiliary balance gear

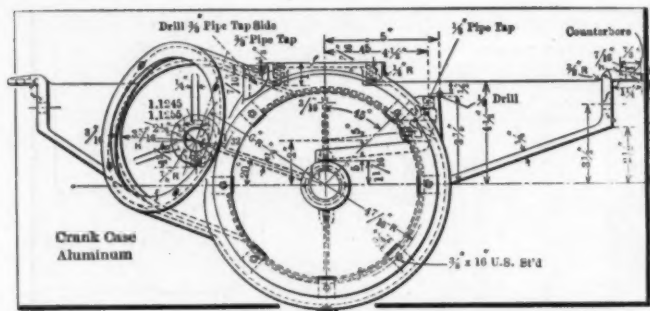


Fig. 9—Crankcase showing opening for balance gear, arms for supporting, and general design

ondary balance is capable of perfection in the sense that the ills of all secondary movements will be dispelled, even so it is the fair claim of the makers that a four-cylinder smoothness accompanies single-cylinder simplicity, and the performance of the motor seems to be the proof of the pudding.

The bore of the cylinder being 4 1-2 inches and accompanied by a longer stroke than formerly (5 inches for 1910), the power is vastly increased over what might have been the normal expectation, since the balance is sufficiently corrected to allow of running the motor at the higher speeds for which four-cylinder motors are adapted, and more power results.

This auxiliary balance is a new idea in American motor practice and in view of the revival of the single-cylinder motor, due to its simplicity and economy, it is reasonable to expect that the auxiliary balancing idea will have a large influence on the future of this situation. It was expected that the balance gear would introduce noise to some extent, which was the theoretical objection to its use, but the quality of work done in the Brush shop seems to be proof against this tendency.

The introduction of the balance gear makes the aluminum crankcase of the motor look as depicted in Fig. 9, looking at it from the end opposite the flywheel, and the opening to the left is that through which the balance gear is passed in assembling or examined thereafter at will.

Fig. 10 represents the steering gear, in which the reduction ratio is 6:1 and the performance is that of a well-thought-out device. The ball on the end of the steering lever is 1 inch in diameter and means are provided to take up lost motion if time makes inroads on the hardened cups which encircle the ball. The gear is rigidly supported to abort possible lost motion from this cause and the sleeves bearing leading to the gearset is long.

An inspection of the material and the way the cars and parts

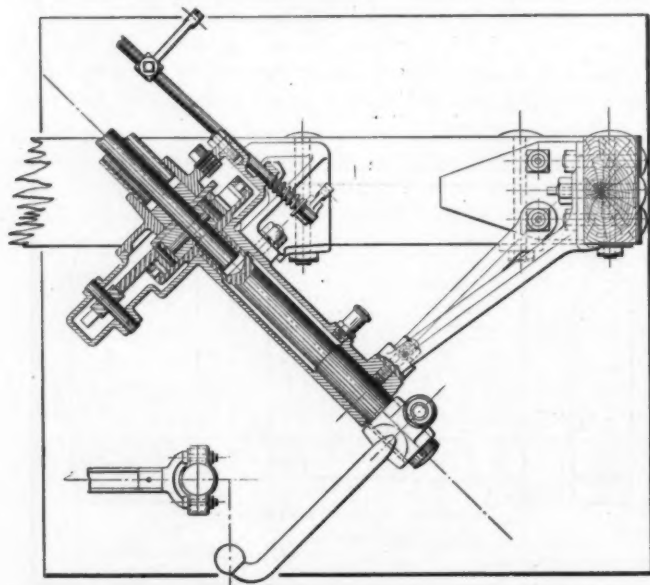


Fig. 10—Steering gear, having a 6 : 1 ratio, long bearings, and strong support to frame

are worked up in the shop leads to the conclusion that a well-thought-out shop system is at the bottom of much of it, and it must be remembered that, while the Brush car is still young, it is built under the "watchful eye" of the responsible head of the Briscoe Manufacturing Company in a well-equipped plant which dates back into automobile history. This plant is primarily devoted to the manufacture of radiators, and is fitted out to do this and other accessory work on a large scale. The machine shop, for illustration, is modern, holds in its makeup a fine assortment of special machine tools of the most modern description, and the force of men available is large and skilled in automobile work. It is for this reason that the Brush car has been brought to a high plane and a large number put on the road, despite the fact that the new plant in which the cars will ultimately be turned out is not ready for occupancy. The new plant will be ready for this year's work.

ACCOMPLISHMENT OF ENGINEERS

The remarkable demands made on automobile engineers and the astonishing way in which these demands have been answered have produced the high-priced car of to-day. It is a wonderful creation and there is not a standard car made that is not worth more than is charged for it. At the same time to stand at any populous thoroughfare and see the hundreds of \$2,000 to \$5,000 vehicles rushing past carrying one or two persons makes one feel that we are living in an age of Babylonian luxuriousness.

In recent times the medium-priced cars have been developed and sprung into favor, taking advantage of the skill and experience in the more luxurious class. Considered as a luxury, the high-priced car is magnificent, but for the great useful demand for transportation off of rails the utility type of car is offered.

Conspicuous efforts to put out very low-priced cars failed because the makers built them crudely, considering price only of importance, whereas the real endeavor must include the lesson learned by engineers and manufacturers, whose goal was results rather than price. We have, furthermore, learned new lessons, finding that just as much accuracy and strength must be put into the smallest car built as in the more pretentious. In point of being "fool-proof" the low-priced car must excel its big prototype for obvious reasons.

The object in the Brush runabout enterprise, aside from the primary one of making money, is twofold: First, to accomplish the broadest part of the demand for simple transportation, and, second, to make purchasers of larger cars appreciate the utility of the other class and thus stimulate the business in general.

PROPER SHOCK ABSORBER ADJUSTMENT

It sometimes happens that the adjustment is not the same on both sides of a car. This may happen even when the pointers indicate the same number on the dial, due to inaccuracy in dial setting. It is a matter of skill to apply the remedy, since it involves a readjustment on the part of the driver, and he must "feel" of the car, so to speak, and in the act determine if the "drag" is the same on both sides. If there is no dial, the adjusting process will be quite the same. It is too much to expect of shock absorbers that they will serve any good end unless they are capable of offering a well-regulated drag and of responding in step with the motions of the body.



Frank Briscoe

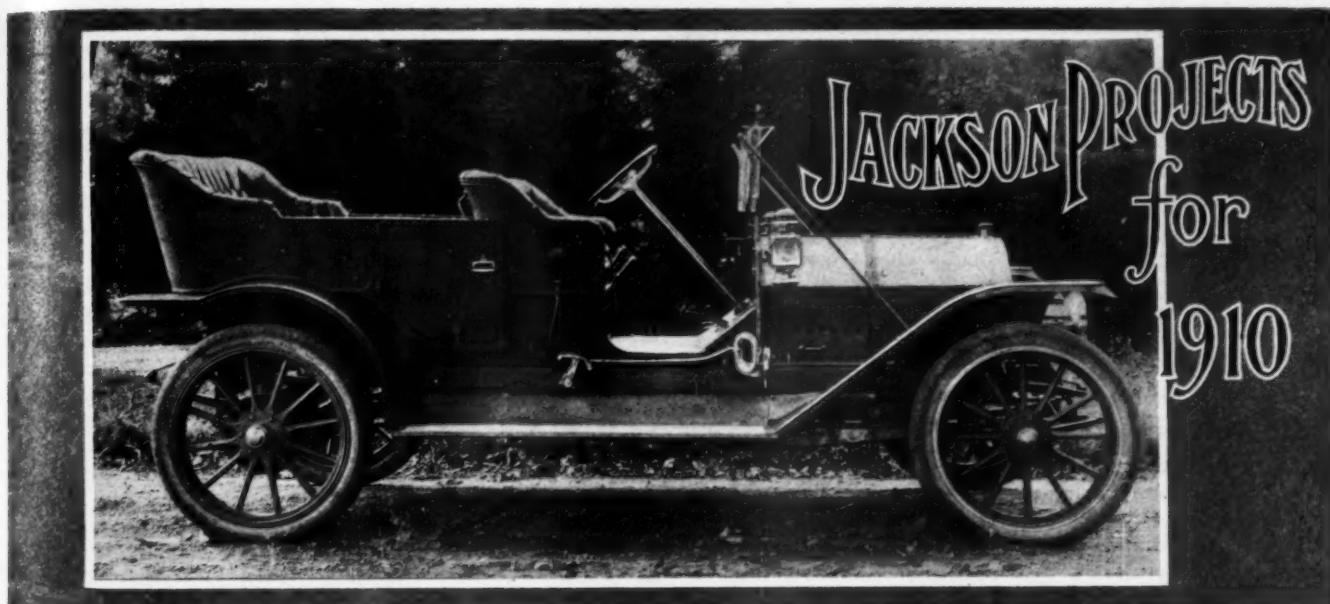


Fig. 1—Model 50 touring car depicting a roomy tonneau and wide side entrance besides good taste

THREE new four-cylinder models, all touring cars, will be included for 1910 as follows: The Model 50 at \$2,200, Model 40 at \$1,700 and Model 30 at \$1,250. In the Model 50 the wheelbase is 122 inches, and 36 x 4 1-2-inch wheels are used. Model 40 has a 110-inch wheel base and 34 x 4-inch wheels, and Model 30 has a 105-inch wheel base and 32 x 3 1-2-inch wheels; all models are with standard tread.

Similarity of Features in Design—It has been the aim of the company to employ the same principles of design to the respective models. The motors are placed vertically, in the front of the chassis, with dimensions as follows:

Model 50, 4 3-4 x 4 3-4 inches bore and stroke respectively, cylinders cast separately, valves in the head, and superimposed camshaft, actuating large, and advantageously disposed valves, thus insuring an excellent torque characteristic and increasing power with increasing speed as per the usual expectation under such conditions. The general appearance of the motor will best be appreciated by inspecting the reproductions Figs. 2 and 3, depicting the intake and exhaust sides respectively.

Model 40, 4 1-2 x 4 1-2 inches bore and stroke respectively, cylinders cast in pairs, valves in the head, camshaft superimposed, actuating 2-inch diameter valves with a 3-8-inch lift. Fig. 4 shows this motor looking at the intake side.

Model 30, 4 x 4 inches bore and stroke respectively, cylinders cast in pairs, valves in the head, super-imposed camshaft, actuating 1 7-8-inch diameter valves with a lift of 3-8 inch, with general appearance as in Fig. 5.

Position of the Valves Considered Advantageous—Since a hemispherical head, or dome of the

cylinders, affords the greatest volume per unit of area of flame swept surface, which has the advantage of increasing thermal efficiency and eliminating radiator capacity troubles, the Jackson idea includes this form of cylinder, and by placing the valves in the head as shown in the figures, but one camshaft is necessary and that is designed as a unit, so self-contained that the shaft, bearings and housings may be removed and replaced at will. Fig. 8 shows a camshaft unit separate from its motor, and the two end bearings are in place while the two middle bearings are removed; one to show how the rockerarm for the tappets and the housing may be separated, and the other shows the housing parted through the middle, disclosing very liberal bushings, which serve as bearing-brasses for the rockerarm.

Adjustments are provided for the purpose of timing the opening of the valves, and to compensate for grinding in the valves, which, however slow may be the wear, must be provided for if a motor is to give good satisfaction for a term of years. The camshaft is provided with a long sleeve bearing on either side of each cam so that there is no chance of deformation of the shaft, and precision of timing is therefore assured from this

point of view. The cams dip in lubricating oil each time that they make a revolution, and the oil is spilled on to the rockerarm, down which it runs and spreads out over the rockerarm bearings as well as the surfaces of the cams, so that friction, wear, and noise are aborted.

General Characteristics of Power Plants—All three of the power plants are self-contained, suspended on three points, and include the transmission gear set in the same couple. Fig. 7 depicts the advantageous manner in which the trans-

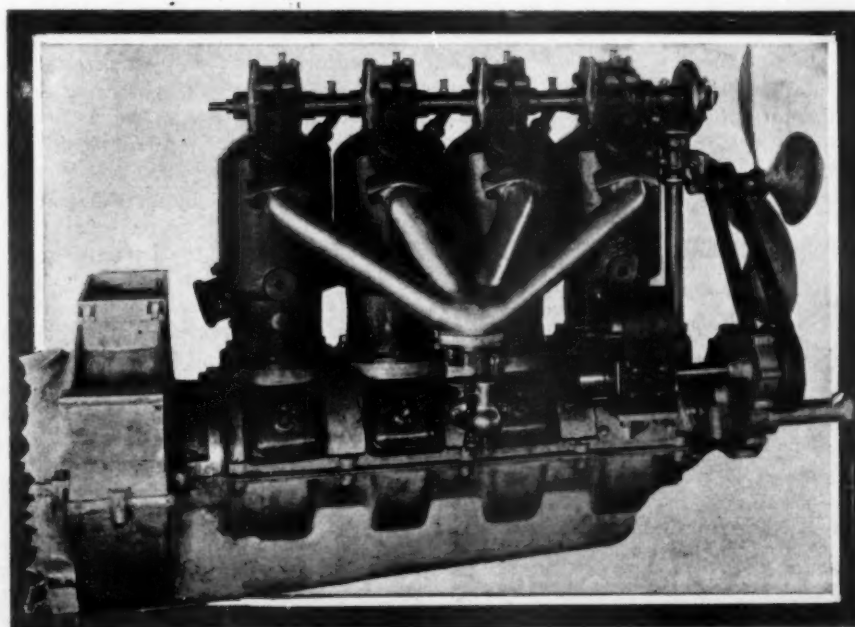


Fig. 2—Intake side of Model 50 motor, showing carbureter, magneto and crankcase broken off back of flywheel

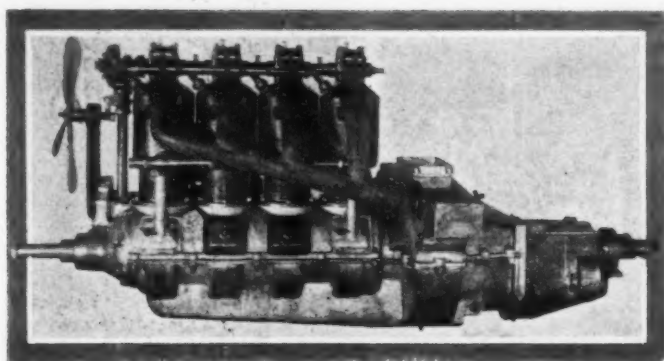


Fig. 3—Exhaust side of Model 50 motor, showing full length of crankcase, and nicely contrived exhaust manifold

mission gear and multiple disc clutch are included in a separate part of the housing, with a stout bolting flange, and referring to Fig 6, *A A A A* are wings of the discs and rotate with the flywheel with holes that register with bolts which slide into place during the process of assembling, thus assuring ease in the process and accuracy of result.

The principle of the three-point suspension is carried out in Jackson models in a most effective way, by means of arms extending out in the plane of the flywheel, to the frame, and the front end of the power plant rests on a cross member. In this way, as the designer claims, the frame can twist around the power plant, in response to road inequalities, and the slight allowance for relative movement prevents the transfer of torsional moments to the power plant. Then, the shape of the crankcase, which is practically circular, is a good guarantee of stability in its relation as a beam on the supports, so that bearings are held in strict alignment.

Lubrication Is Positive and Novel—The lower half of the crankcase is separable, including the well for the flywheel, and an oil chamber extends all the way along, slanting towards the flywheel. Oil is placed in the flywheel chamber and is whisked up by the same, scraped off into a channel, and flows away to the respective bearings. All excesses of oil that land in the respective crank chambers, formed by cross walls in the crankcase, are picked up and landed into channels and flow on, increasing

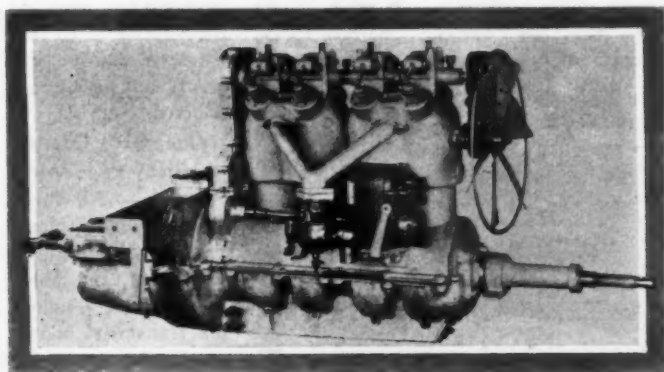


Fig. 5—Model 30 motor from intake side, showing housing for the silent chain drive for the camshaft

the tide of lubrication, which falls in profuse and continuous streams over the several bearings. From the bearing furthest from the flywheel a return channel is provided by virtue of which all the oil returns to the flywheel well, thus completing the cycle. This process of lubricating is continuous, and all that remains is to replenish the slight loss which is accounted for by the oil used to lubricate the pistons.

Dual Ignition Includes Magneto—Besides a coil and battery for use in starting and in an emergency, all models are provided with a Splitdorf magneto, located in front of the carburetor on the right side of the motor in each case. The magneto is flexibly installed, and the system of linkages and levers by which the spark is advanced and retarded is reduced to praiseworthy detail, free from lost motion and undue complication.

Fuel System Includes Schebler Carbureter—The carbureter is placed on the right side of the power plant, low enough down with respect to the cylinders to assure that liquid fuel will not creep up and into the combustion chambers of the cylinders, hence carbon formations are aborted. The intake is of aluminum, with a branch to each individual cylinder in the 50 and to each pair of cylinders in the remaining models. The intake is absolutely tight, of a sectional area to deliver the exact requirement of mixture, remembering that it can be too large as well as too small. The Schebler carbureter, which, as a type, will not require

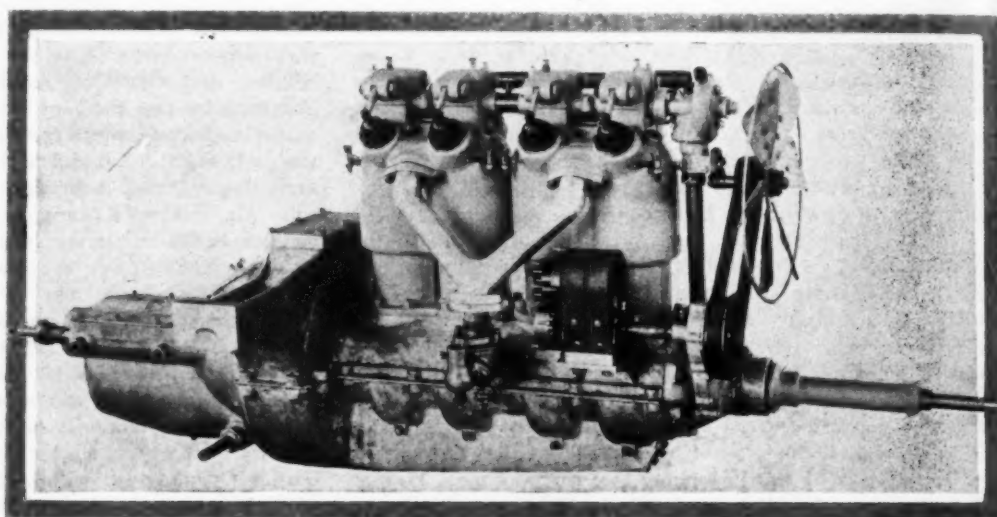


Fig. 4—Model 40 motor looking at intake side, showing carbureter, magneto, fan and cranking extension

explanation at this time, is selected for each model in point of size conforming to the best results, having experimented sufficiently to establish the governing facts. All piping from the gasoline tank, in each model, is made with a view to permanence, but provision is made for quick work if, perchance, foreign substances should collect in any quantity.

Cooling Is Aided by an Efficient Fan—The fan is placed just behind the radiator, between it and the front cylinder of the motor. It is of the latest die-formed type, with six blades of liberal area, set at an angle which is found to deliver the most air, and runs on ball bearings, fastened through a spindle of good diameter to a bracket of an adjustable type, extending out from the bevel gear housing of the camshaft. A wide flat belt drives the fan and takes its movement from a flanged pulley on the end of a spindle which has two bearings in an extension of the front end of the crankcase, and the gear which drives the spindle is enclosed meshing with a mate in its train, with a pinion on the crankshaft. The radiator, of liberal front area and sufficient depth, considering the excellence of the fan used and the hemispherical contour of the combustion chambers of the cylinders, maintains the temperature in all cylinders on an even level, and steaming is prevented, although the complication of a water pump is eliminated and the system works thermo-syphon.

Transmission and Other Notable Features—Models 50 and

40 deliver power to multiple disc clutches, as shown in Fig. 6, with large discs, submerged in lubricant, and actuated by a spring with positive release upon manipulating a foot pedal. The spring does not have to be of great strength, because its thrust is applied to a toggle system, which multiplies the thrust and gradually but positively applies an adequate pressure to the discs, pressing them into close contact, and when the foot pedal is pressed the discs are separated by springs placed for the purpose, one of which shows at B. The toggle system is adjusted by backing off the stud C and winding up the shell-spider D, all

as indicated in Fig. 6. In this way lost motion due to wear of discs is taken up and the clutch, in each case, may be maintained in good working order at all times with a minimum of effort. Model 30 has a cone clutch, with a metal face, and runs in oil also.

The transmissions are of the three-speed selective type (and reverse) in each model, prime and lay shafts rotate on ball bearings, and the shifting selectors are of simple but positive

Fig. 6—Multiple disc clutch used on Models 40 and 50, showing toggle motion, discs and separating springs

design affording absolute certainty of action. The gears and shafts are of special steel, heat treated to bring out the desired hardness without loss of kinetic qualities. The teeth of the gears are wide, cut on Fellows' shapers to assure accuracy and mathematical precision of shape, and the ends of the teeth are chamfered on a special automatic machine to enable them to engage without shock or clash, while the aim is also to avoid cutting away an excess of the faces of the teeth in the chamfering process, which would reduce ability.

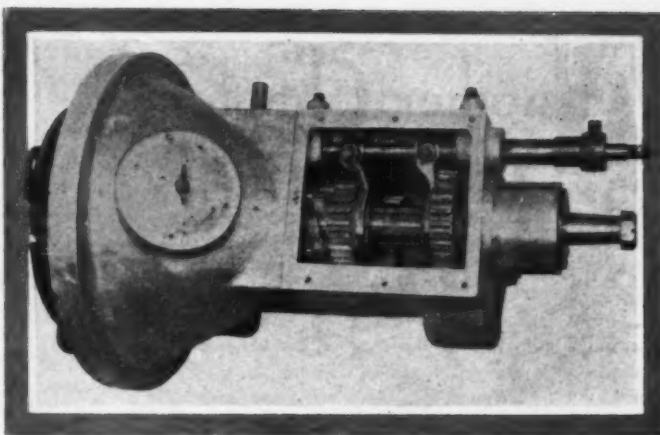


Fig. 7—Transmission and clutch case of Model 40, with cover off, disclosing transmission gears

Price Includes a Fine Array of Equipment—Besides a Split-dorf magneto on each model, there are the following considerations: Model 50, at \$2,200, includes a wind shield and Prest-O-Lite tank, lamp equipment, tools, etc. The body is a standard touring design, of an advanced order in appearance and utility, seating five. At an extra cost of \$50 two additional seats are provided, making it a seven-passenger car. This model is also delivered at \$2,200 with a four-passenger tourabout body, which is regarded as one of the fine creations of the year.

Model 40, at \$1,700, includes the usual equipment and a five-passenger body.

Model 30, at \$1,250, will be furnished with a detachable tonneau, making it a five-passenger touring car, or it will be provided with a rumble seat, as a roadster, at the same price. The usual equipment is included at the price named.

The Jackson Automobile Company, at Jackson, Mich., with new additions to buildings and machinery, have 5,000 cars in the aggregate under way, and expects to deliver, as usual, on time. A large part of the increase over the last year's product is already placed, and a visit to the plant of the company disclosed a hive of industry, with system everywhere, all leading up to the great main issue, i.e., the rapid completion, on a basis of accuracy, of more cars than were ever before contemplated.

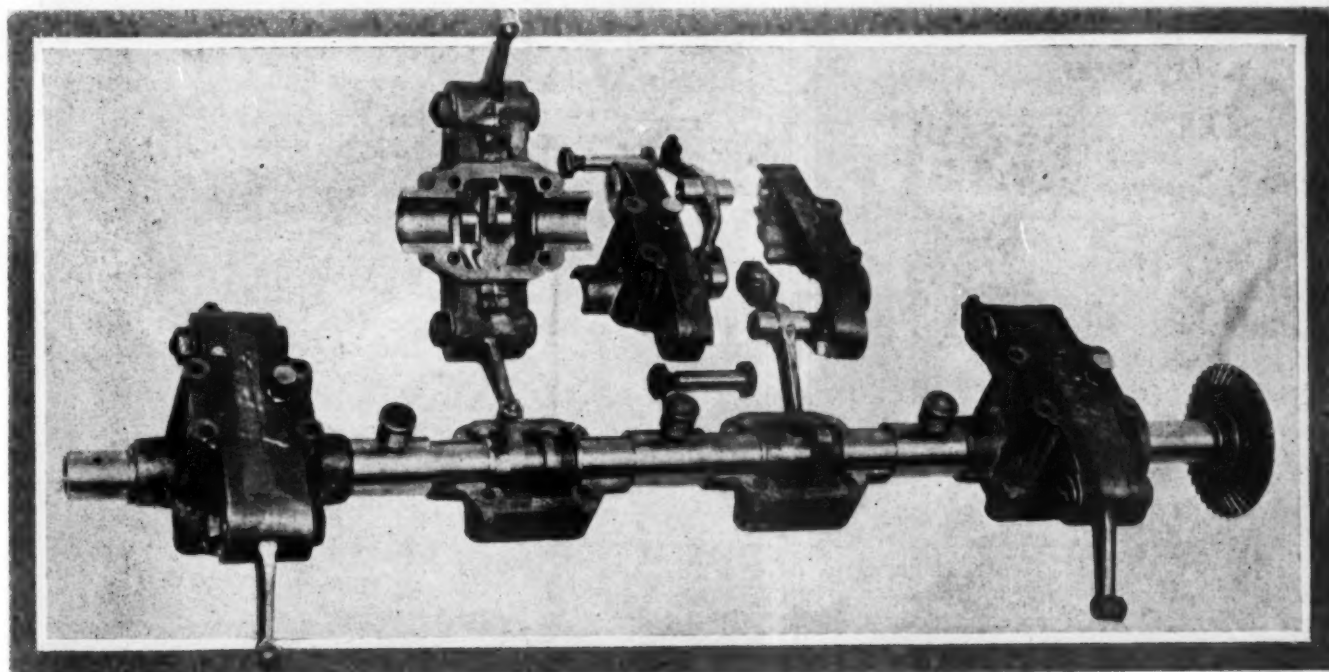
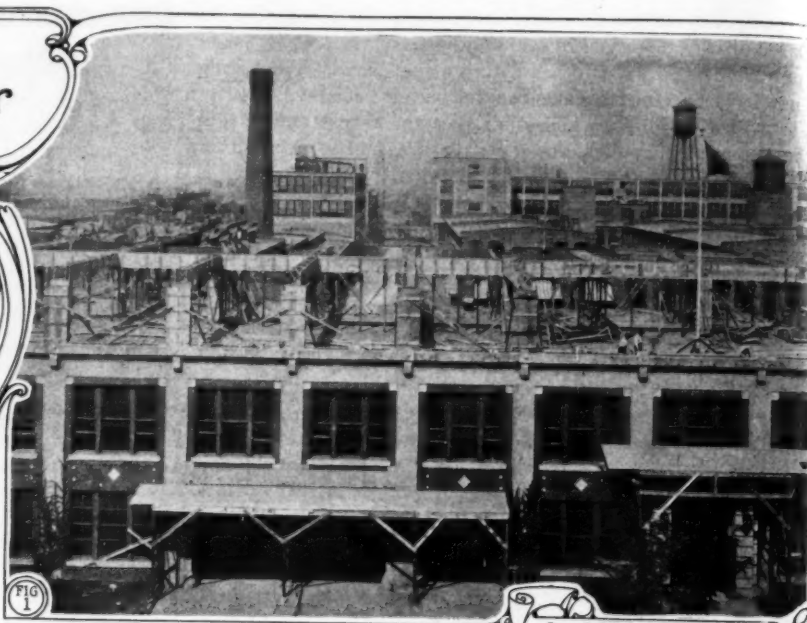
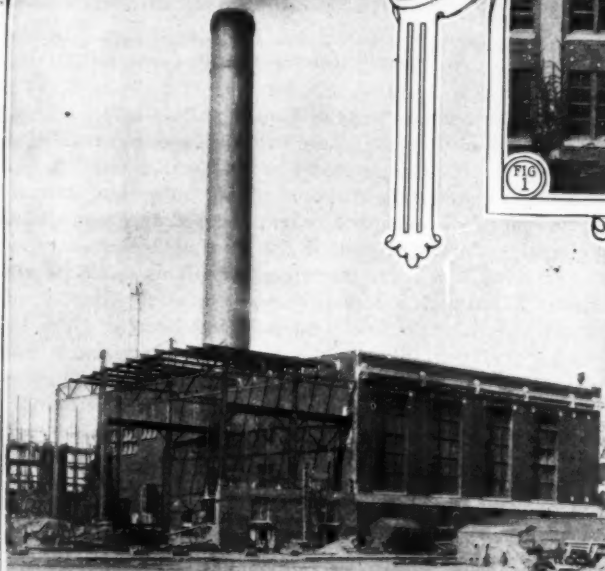


Fig. 8—Showing details of camshaft rockerarm construction, with bevel gear for Models 40 and 50. Chain drive for Model 30 not shown

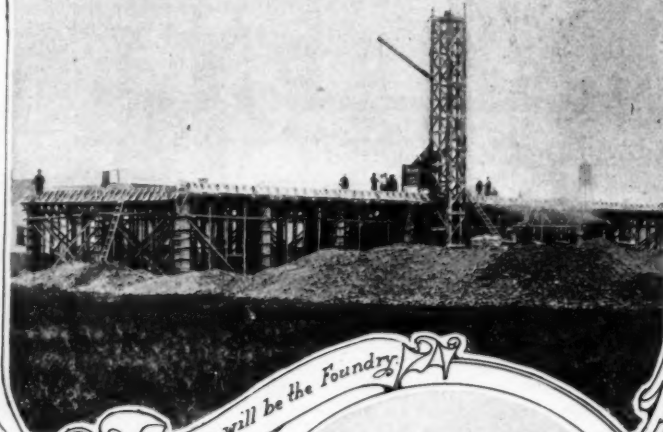
Another Chapter in Packard Progress



An Addition to the
Administration Bldg.



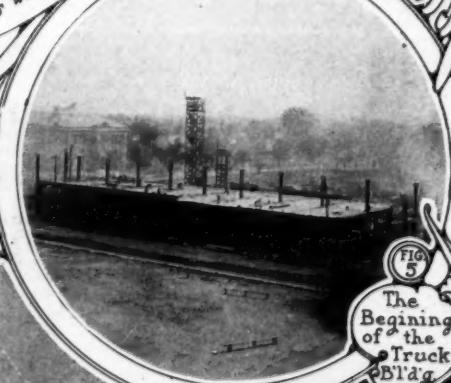
Another
Extension
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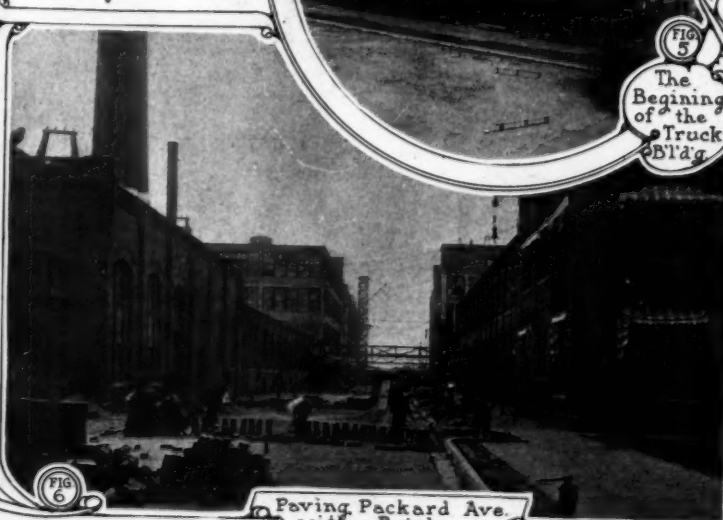
This will be the Foundry



Two More Floors on One of the
Wood Working Shops



The
Beginning
of the
Truck
Bldg.



Paving Packard Ave.
with Brick

PACKARD FACTORY SPREADS IN ALL DIRECTIONS

LOOKING over the plant of the Packard Motor Car Company, at Detroit, Mich., even at the expense of much time, discloses so many projects in process that it is with the greatest difficulty that a single story can be concentrated upon. The idea that crops out with the greatest prominence is, after all, one to be pictured better than told, and it represents the extent to which the company is putting up buildings, in order that this vast and growing business will be properly housed, taking into account the Packard ideas of permanence, convenience and to maintain the reputation of Packard cars.

Architecturally the buildings at the plant, when they were originally planned, took cognizance of the future, and foundations were laid with sufficient stability to allow of adding to the height in each case. Fig. 1 of the administration building shows how well the architects understood the situation, for, while adding 50 per cent. to the actual floor space, the project is carried on without the slightest inconvenience to the company. The original administration building was two stories high, and the floors are so weather-tight that they serve as a flat roof while the addition of a story is being made. All building work is done from the outside, and while the builders are pushing the work at top speed, even so, within the administration building, nothing of the usual builders' hubbub disturbs the serenity of the counting house, engineering office, laboratory, or headquarters offices.

Power Makes the Wheels Revolve—The power which emanates from the administration building would avail very little in the directions of actual results did it not include instructions to provide a sufficient addition to the power plant, so that the contemplated increase in machinery will include the power to run it. Fig. 2 is of the original power house and addition being made to it. When the building work is well along, power-plant equipment will be ready to install and in this way power to run the new machinery will be at hand at the proper time. As an incident it will be worth while to observe that the power plant is centrally situated, but somewhat isolated, so that the electrical transmission is made with a minimized loss, and in case of fire in any one of the buildings the power plant will not be in danger, and the fire hazard is reduced.

Scarcity of Material Demands Attention—The wise maker of automobiles will look to the source of material and in so far as it is possible to do so keep all such matters under direct control. The Packard is one of the American concerns which builds the entire automobile rather than to rely upon parts makers, and one of the more important questions lies in having a foundry at hand from which to procure good castings of every description. Fig. 3 depicts the new foundry in course of erection, and when this structure is completed, which will be at a very early date, the company will be in a far better position to do all of its own work of this character and on the extended basis required, as indicated by demand.

If it is important to have a foundry to draw upon, the same incentive holds with the woodworking plant, especially in view of body work. The Packard makes all its own bodies, and while they are of the class known as aluminum, the fact remains that the framing is of wood and demands treatment under conditions involving an extensive line of special woodworking machinery. Then, there are wheels to make, and such other parts as mahogany dash and other trim parts. Fig. 4 shows an extension of the woodworking plant, and since Packard bodies are of the most substantial character, in view of the large output of the company it is not to be wondered at if the woodworking plant is a very noticeable proportion of the whole establishment, ranking high in relative value.

Future Is Reflected as in a Mirror—The question is frequently asked: What is the future to be? Will commercial vehicles displace horses entirely? The Packard idea seems to be in favor of a horseless future, and Fig. 5 represents the new

building, now being erected by the company, in which trucks will be built. In this is all the evidence necessary, showing that this company has faith in the future, and that commercial vehicles will be of the automobile genus, and that the remaining horses must go. Some two years past, when the Society of Automobile Engineers were entertained at the Packard plant, the truck work then attracted considerable attention, and the character of truck work being done was such that its future could not be accommodated in the plant as it then existed, filled as it was, at nearly every point, with pleasure car work. That the company had in mind a comprehensive scheme will now be seen, and it is a fair inference that there is now sufficient demand for trucks and other commercials of the character built by the company to warrant the expense of a large new addition.

An Industrial City Expanding—Gradually the plant expands; never a week goes by without witnessing the laying of a new foundation, and this has been the condition for several years. Despite this continual advance there is a picturesque similarity between all the buildings, and each one fronts on a wide brick-paved street. The impression is that of a large industrial city, with clean, well-paved streets and accommodation for traffic on a large scale. Fig. 6 portrays the situation at it exists throughout the entire plant, and with a view to adequate fire protection hydrants are placed at points of vantage, one of which is in the foreground. The sidewalks are wide, and here and there a bridge spans the streets, affording short cuts between departments, thus economizing in time required in the handling of materials, and in intercommunication.

Some of the Problems Are Engrossing—In observing the output of a plant account must be taken of the extent to which it is devoted to the manufacture of all the units that go into cars. In closely examining the Packard plant, for illustration, it is at once seen that much room is required in the manufacture of bodies. Of the whole force of men, footing up to the enormous number of more than five regiments of 1,000 each, not counting a full quarter of a regiment of officials and staff men, but relatively few of them are to be found in the body plant, despite the large amount of room required. In other parts of the plant there is a man for every square yard of space, and the obvious conclusion is that if a company builds every part of every car made (neglecting tires, ignition equipment, etc.), the amount of room needed, per car put out, will be far more than the average observer is likely to suppose.

True, the output in cars will be large or small depending upon the quality, and when the whole matter is simmered down to the last shred of sound reasoning, the output of a shop must be measured in dollars per square foot of floor space. In an estimate of this sort it is necessary to allow for the efficiency of the equipment used in the manufacture of the parts, and the extent of congestion of the space. It is a moral certainty that a very congested, poorly lighted building will result in inferior work and the real value of the product may then be far below the selling prices asked. These and many other reasons are at the bottom of the Packard plans, and it seems to be the idea there to provide commodious, sanitary, well-lighted buildings, and to do all the work, in order that the cars made will be in value, in the fullest accord, with the price asked.

The factory now comprises 21 acres of floor space in operation, with four acres under construction, as shown in the illustrations. Since there are now about 1,000 men on the night force, it may be that the addition of four acres of floor space will, to some extent, reduce the necessity for night work, the addition being in about the same ratio as the night force bears to the total force. This will, of course, bring good results, it being the case that night work is costly, and, on the whole, the best indication possible to show that the Packard plant must expand; hence the reason for the great activity as here portrayed.

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AN IDEA IN GARAGE CONSTRUCTION

In the course of an excellent editorial article on the subject of "The Garage from the Practical and Hygienic Aspects," *The Motor Trader* (English) brings out an excellent point that pertains to the modern garage, public rather than private, but, nevertheless, of wide interest. This is to the general effect that the ordinary garage is very much lacking in the all-important matter of ventilation. It is a fact, usually lost sight of, that the exhaust vapors of an automobile engine consist to a large extent of carbon monoxide, which is a poisonous gas. In ordinary running in the air this matters little, for the gas is diffused through an enormous quantity, relatively, of air, so that its influence is very small and is not felt even in close proximity to the offending vehicle.

Within the close confines of the garage, whether the doors be closed or not, an engine exhausting for a period of several minutes vitiates no small amount of air, rendering it, first, unfit to breathe, and, later on, through the engine continuing to run indoors, actually poisonous. Perhaps this accounts for the mental sluggishness of the ordinary public garage attendant or employee. At any rate, in the construction of future garages, and the improvement of existing structures devoted to this use, the thought is well worth some consideration. The article said in part:

Then there is the question of the health of the inmates or employees to be regarded. Viewed from this standpoint, it would be hardly too much to affirm that, did the sanitary officers in many districts, particularly in the large towns, exercise even a part of

their authority, they could insist on the remodelling or compulsory closing of very many motor garages and workshops. The danger here is not so much arising from a deficient cubic space per inmate, but the worse one of his breathing an atmosphere grossly injurious by the presence of a varying quantity of carbon monoxide. The condition of the average garage is decidedly dangerous in this respect. The fact that part of the employees' daily task lies in testing motors increases the extent of the responsibility of the owner by the same ratio as the danger is increased or reduced by such factors as the capacity of the premises for the work in hand, their state hygienically regarded, and the varying amount of the poison that is being discharged from the motors. Traders contemplating an adaptation of existing premises should consult their local authority and first satisfy themselves of the possibility of their being enabled to carry out what may be required, and should also not overlook the trend of modern workshop planning so as to insure the most healthful conditions to the workers.

In the smaller private garage structure this idea is worthy of even more consideration, for the reduced size of the building increases the danger from this cause. As a consequence, this matter of ventilation should be given increased thought by the owner about to build himself a garage or motor house.

YESTERDAY AND TO-DAY IN RACING

Public sentiment changes quickly. It seems but yesterday that the talk of a competition on the public roads called forth the threat of injunctions and other forms of interference. The authorities were fearful of permitting what was designated as "usurpation of the highways by speed-crazed beings who belonged behind the bars." Gradually it became evident that the general public regarded an automobile contest as the greatest spectacle of modern times, and, furthermore, wanted such events instead of having them suppressed.

When one reads of a 200-mile race in Fairmount Park, Philadelphia, with a thousand and more city police guarding the course in the presence of a Mayor who had no hesitancy in presenting the prize to the winning driver, the fact is brought home somewhat startlingly of the present liberal attitude of the public officials, brought about undoubtedly by the knowledge that the people themselves are thoroughly in favor of a motor holiday.

Over such a tortuous course as the one in Fairmount Park cars are tested in every particular, and, while the personal equation, in the form of the driver, enters into the contest and makes it one of man and machine, the fact remains that any car which can survive such a gruelling examination creditably is worthy of the patronage of the discriminating buying public. There are still a few discrepancies in the exact definition of a "stock" chassis, but the rules governing are much nearer perfection than ever before, with indications that necessary revisions will make the 1910 competitions open only to cars the mates of which will be found in the salesrooms of every reputable manufacturer believing in one or another form of competition as a means of publicly demonstrating the worth of his product.

As to the exact future of racing there seems to be much difference of opinion, though indications are that the season of 1910 will be marked by a plethora of contests throughout the country, perhaps attaining a climax to be followed by a lessening of public interest. The agitation to revive the Grand Prix in France would foster the belief that the foreign manufacturers had found an entire absence of racing somewhat detrimental as a whole, though the class abroad most interested in competition has turned to the flying brigade.

CHICAGO SHOW HAS TWICE TOO MANY APPLICANTS

TWICE too many applications for the space available at the Chicago show, February 5 to 12, next, was the problem that confronted the management at the session held October 6 at the N. A. A. M. headquarters, No. 7 East Forty-second street, New York City. There were just 104 applications for space in the automobile section. Heretofore automobile exhibits have been confined to the main floors of the Coliseum, Annex, and First Regiment Armory, while a few cars have been placed in the Coliseum basement. This year, after exhausting the entire basement, there were still eight automobile manufacturers for whom it was impossible to provide any space at all, but who will, of course, be given the first opportunity to take advantage of any withdrawals. Since the allotment six other automobile manufacturing concerns have applied for space, so that there are now fourteen on the waiting list.

American Locomotive Company.....Providence, R. I.
 American Motor Car Company.....Indianapolis
 Anderson Carriage Company.....Detroit
 Apperson Bros. Automobile Company.....Kokomo, Ind.
 Atlas Motor Car Company.....Springfield, Mass.
 Auburn Automobile Company.....Auburn, Ind.
 Austin Automobile Company.....Grand Rapids, Mich.
 Baker Motor Vehicle Company.....Cleveland
 Bartholomew Company.....Peoria, Ill.
 Berliet Import Company.....Chicago
 Black Mfg. Co.....Chicago
 Brush Runabout Company.....Detroit
 Buckeye Mfg. Co.....Anderson, Ind.
 Buick Motor Company.....Flint, Mich.
 Cadillac Motor Car Company.....Detroit
 Cameron Car Company.....Beverly, Mass.
 Cartercar Company.....Pontiac, Mich.
 Chadwick Engineering Works.....Pottstown, Pa.
 Chalmers-Detroit Motor Company.....Detroit
 Columbia Motor Car Company.....Hartford, Conn.
 Columbus Buggy Company.....Cleveland
 Corbin Motor Vehicle Corp.....New Britain, Conn.
 Dayton Motor Car Company.....Dayton, O.
 Dorris Motor Car Company.....St. Louis
 Elkhart Motor Car Company.....Elkhart, Ind.
 Elmore Mfg. Co.....Clyde, O.
 Everitt-Metzger-Flanders Company.....Detroit
 F. A. L. Motor Company.....Chicago
 Fiat Automobile Company.....New York
 Franklin Mfg. Co., H. H.....Syracuse, N. Y.
 Fuller Buggy Company.....Jackson, Mich.
 Gaeth Automobile Company.....Cleveland
 Grabowsky Power Wagon Company.....Detroit
 Great Western Automobile Company.....Peru, Ind.
 Haynes Automobile Company.....Kokomo, Ind.
 Holsman Automobile Company.....Chicago
 Hudson Motor Car Company.....Detroit
 Hupp Motor Car Company.....Detroit
 International Harvester Company.....Chicago
 Interstate Automobile Company.....Muncie, Ind.
 Jackson Automobile Company.....Jackson, Mich.
 Jeffery & Company, Thos. B.....Kenosha, Wis.
 Jewel Carriage Company.....Cincinnati
 Kimball & Company, C. P.....Chicago
 Kissel Motor Car Company.....Hartford, Wis.
 Knox Automobile Company.....Springfield, Mass.
 Lion Motor Car Company.....Adrian, Mich.
 Locomobile Co. of America.....Bridgeport, Conn.
 Lozier Motor Company.....New York City

The entire gallery of the Coliseum, and the principal part of the second floor of the Coliseum Annex have been allotted, as heretofore, to the Motor & Accessory Manufacturers, who will make their own allotment. At this time the number of applications from members of that association is greater than in any previous year. All remaining space on the second floor of the Coliseum Annex is reserved for the Motorcycle Section. There are twenty spaces and applications in hand for over forty. Unattached makers of accessories have been given the gallery of the First Regiment Armory. It was necessary to allot them one space apiece, and even then there is not enough space in this section to go around. This is an unfortunate situation, for the luckless ones will have to buy space from those given space.

A list of the manufacturers of automobiles who have been allotted space is appended:

Matheson Motor Car Company.....Wilkes-Barre, Pa.
 Maxwell-Briscoe Company.....Tarrytown, N. Y.
 McIntyre Company, W. H.....Auburn, Ind.
 Metzger Motor Car Company.....Detroit
 Midland Motor Car Company.....Moline, Ill.
 Mitchell Motor Car Company.....Racine, Wis.
 Moline Automobile Company.....East Moline, Ill.
 Moon Motor Car Company.....St. Louis
 National Motor Vehicle Company.....Indianapolis
 Nora Motor Car Company.....Newark, N. Y.
 Nordyke & Marmon Company.....Indianapolis
 Oakland Motor Car Company.....Pontiac, Mich.
 Olds Motor Works.....Lansing, Mich.
 Packard Motor Car Company.....Detroit
 Palais de l'Automobile.....New York
 Peerless Motor Car Company.....Cleveland
 Pennsylvania Auto-Motor Company.....Bryn Mawr, Pa.
 Pierce-Arrow Motor Car Company.....Buffalo
 Pope Mfg. Co.....Hartford, Conn.
 Premier Motor Mfg. Co.....Indianapolis
 Rapid Motor Vehicle Company.....Pontiac, Mich.
 Rauch & Lang Carriage Company.....Columbus, O.
 Regal Motor Car Company.....Detroit
 Renault Freres Selling Branch, Inc.....New York
 Reo Motor Car Company.....Detroit
 Ricketts Auto Works.....South Bend, Ind.
 Rider-Lewis Motor Car Company.....Muncie, Ind.
 Royal Tourist Car Company.....Cleveland
 Schacht Mfg. Co.....Cincinnati
 Selden Motor Vehicle Company.....Rochester, N. Y.
 Speedwell Motor Car Company.....Dayton, O.
 Simplex Motor Car Company.....Mishawaka, Ind.
 St. Louis Car Company.....St. Louis
 Staver Carriage Company.....Chicago
 Stearns Company, The F. B.....Cleveland
 Stevens-Duryea Company.....Chicopee Falls, Mass.
 Streater Motor Car Company.....Streator, Ill.
 Studebaker Automobile Company.....Cleveland
 Studebaker Automobile Company.....Cleveland
 The White Company.....Cleveland
 Thomas Motor Company, E. R.....Buffalo
 Toledo Motor Company (Overland).....Toledo, O.
 Waverly Company.....Indianapolis
 Wayne Works.....Richmond, Ind.
 Winton Motor Carriage Company.....Cleveland
 Woods Motor Vehicle Company.....Chicago
 Woods Motor Vehicle Company.....Chicago
 York Motor Car Company.....York, Pa.
 Zimmerman Mfg. Co.....Auburn, Ind.

HOW PALACE SHOW EXHIBITORS WILL BE PLACED

AT the recent drawing for space in the Tenth International Automobile Show, which will open New Year's Eve in Grand Central Palace, New York, 37 members of the American Motor Car Manufacturers' Association secured preferred space on the main floor, while more than 40 makers not members of the A. M. C. M. A. and 125 accessory concerns not included in membership of the Motor and Accessory Manufacturers, Inc., were allotted space on the first and second balconies. All records for space in automobile shows were broken, as 305 motor car makers and accessory manufacturers were allotted space. At no time in the history of the Palace Show has the show committee met with as much difficulty in trying to satisfy demands for space as this year. An unusual demand was made for space by members of the A. M. C. M. A. and other motor car makers, while outside accessory firms fairly deluged Chairman R. E. Olds and his associates with applications. The Ford Motor

Company, of Detroit, secured the first draw, and selected the same space in which Ford cars have been exhibited for the past two years. Other concerns securing large spaces include Reo Motor Car Co., Brush Runabout Co., Premier Motor Manufacturing Co., Mitchell Motor Car Co., Dayton Motor Car Co., Maxwell-Briscoe Motor Co., Jackson Automobile Company and Mora Motor Car Company.

Other members of the A. M. C. M. A. who drew preferred space include Oakland, Marmon, Regal, Pullman, Moline, Lambert, Atlas, Hupmobile, National, McIntyre, American Simplex, Austin, Pennsylvania, Moon, Cartercar, American, Holsman, Pierce, Chadwick, Glide, Standard, Ohio, Gaeth, Speedwell and Midland. Of the commercial motor car makers belonging to the A. M. C. M. A. who secured preferred space on the first balcony are Rapid, Mack and Grabowsky.

As was the case last year, members of the Importers' Auto-

mobile Salon have secured a block of preferred space on the main floor, which has been secured by Fiat, C. G. V., Panhard, Renault, Lancia, Isotta, De Dietrich, Clement, Delahaye, Delaunay-Belleville, DeDion, Hotchkiss, Züst and S. P. O.

Pleasure vehicle makers who were allotted space on the first balcony include Croxton-Keeton, Kissel Kar, Inter-State, Kline Kar, Benz, Black, Cameron, Coates-Goshen, Columbus, Crawford,

Empire, Houpt, McCue, Everett, Sultan and Allen-Kingston. Commercial vehicle makers on the first balcony not members of the A. M. C. M. A. are the Gramm-Logan, Hart Kraft, Lansden, Martin, Saurer, DeDion and Randolph.

On the second balcony will be found not only accessory makers as in the past, but about 18 makers of cars.

Contracts for the spaces allotted are being mailed.

LICENSED BODY AGAIN INCLUDES OLDS AND BUICK

WHILE an announcement outlining A. L. A. M. plans is anticipated within the next few days, it is now known that the General Motors Company group will be licensed makers. Whatever differences existed between the Licensed body and the Buick company have been satisfactorily adjusted, and the Olds Motor Works has been reinstated to active membership, which means that these concerns will be seen in the Garden show for the first time in two years. W. C. Durant, the vital factor in the General Motors segregation, is authority for the information.

Developments in relation to the Ford Motor Company have been somewhat sluggish, which means that the situation is the same as it was before. Henry Ford preferred to carry the burden of the Selden suit himself without any outside assistance, and apparently he intends to continue his attitude.

In the first story of the startling developments, printed in THE AUTOMOBILE of last week, seven A. M. C. M. A. concerns were given as assured new members of the A. L. A. M. These were Maxwell, Reo, Premier, Mitchell, Dayton, Jackson, and Regal. The last named being one of the later entrants into the industry,

it is understood that its Licensed connection will be on slightly different lines to that of the others. In fact, the impression prevails that conditions governing not a few of the probable applicants may result in two kinds of membership. The continued healthy state of the industry is a condition generally desired, and it is believed that the present direction of A. L. A. M. affairs will not be subjected to any radical interference.

In obtaining the order of the court's decree, the Licensed Association is meeting with a slight delay because of the change in name of the Electric Vehicle Company to the Columbia Motor Car Company. While this has no effect whatever upon the decision itself, the delay interferes with plans mapped out.

The A. M. C. M. A. members who have joined the A. L. A. M. will retain their membership in the former body, and participate as usual in the Grand Central Palace show.

"Membership in our association has nothing to do with the Selden patent," said Alfred Reeves, the A. M. C. M. A. general manager, "and twenty-five of our members might in the end become members of the A. L. A. M. also."

WHAT THE N. A. A. M. EXECUTIVE COMMITTEE DECIDED UPON

TO a special committee consisting of L. H. Kittredge, W. R. Innis and Charles Clifton has been referred the question of the advisability of amending the standard warranty of the N. A. A. M. This action was taken at the regular October meeting of the executive committee, held at the New York headquarters, 7 East Forty-second street, October 6.

Frank Briscoe, representing the Brush Runabout Company; W. C. Johnson, representing the Waverley Company; W. H. Van Devoort, representing the Moline Automobile Company; R. H. Salmons, representing the Selden Motor Vehicle Company, and W. S. Austin, representing the Austin Automobile Company, were elected to membership.

The membership of the Electric Vehicle Company was transferred to the Columbia Motor Car Company, represented by H. W. Nuckols, and the membership of the Royal Motor Car Company to the Royal Tourist Motor Company, represented by George J. Dunham.

The executive committee decided to actively support the promotion of a convention to be held in Washington, either in December or January, designed to promote the interests of the National registration bill now before Congress. This matter is in the hands of the legislative committee and of Charles Thaddeus Terry, the association's counsel. It will be pushed vigorously and the results will doubtless show, that it was worth while.

IMPORTANT DECISIONS OF THE A. A. A. CONTEST BOARD

PROTESTS of a varied sort were passed upon by the Contest Board of the A. A. A. at a session held in New York City, October 5 and 6, the entire board being present.

In connection with the 1909 A. A. A. reliability tour, the protests of H. O. Smith and W. H. VanDevoort, entrants of the Premier and Moline cars, respectively, against the findings of the technical committee on the two Pierce touring cars and No. 108 Pierce runabout, were withdrawn.

The action of S. B. Stevens in calling off the 300-mile race of August 21 on the Indianapolis motor speedway was sustained, and in addition to denying the protest of the Jackson Automobile Company, that concern was disciplined by suspension from entering any contest until January 1, 1910, for advertising that it had won the race in question.

The Premier Motor Manufacturing Company's protest against the Quaker City Motor Club was sustained. The protest was on penalties imposed for time in checking at controls after the

blockade at Giant's Despair, Wilkes-Barre, Pa., during the Quaker club's Spring endurance run. It was found that the subject hinged on part of the instructions given the contestants by a representative of the club at the instruction meeting, wherein it was stated in substance that, owing to road conditions, if a blockade occurred to a contesting car by reason of a disabled car, the committee would take care of it.

Relative to the appeal of the Dayton Motor Car Company in the hill climb of the Automobile Club of Cincinnati, two protests were entered against awarding the first prize to the Stoddard-Dayton car on the ground that the car was not "stock" in the meaning of the definition in the rules, and the referee decided in favor of the appellants.

On the report of the referee of the Brighton Beach races, August 27, and of a member of the contest board present, the entrant and driver of S. P. O. Car No. 1 were each suspended to January 1, 1910, and the driver fined \$100 and suspended.

What the Clubs Are Doing These Days

STATE COMMISSIONER TO LEAD TIME RUN

HARTFORD, CONN., Oct. 11—State Highway Commissioner MacDonald will set the pace for the sociability and secret-time run of the Automobile Club of Hartford, to be held October 22. The purpose of the event is to celebrate the opening of the new seven-mile Berlin turnpike, which will also furnish the course for the run. On the return trip from Berlin to Hartford the commissioner will drive his car at what he believes a proper speed, both for safety and for the preservation of the road. His time will be taken and placed in a sealed envelope. The contestants will be started at one-minute intervals, and each will attempt to approximate the commissioner's time. Several prizes have been offered. The winners will be announced at a banquet at the Allyn House.

MILWAUKEE CONSIDERING A CLUBHOUSE

MILWAUKEE, WIS., Oct. 11—At the annual meeting of the Milwaukee Automobile Club the following directors were elected: M. C. Moore and C. W. Norris, to serve two years; C. S. Drake, Christian Scholtka, M. W. Pipkorn, J. E. Farber and J. F. Schreiber, to serve three years. Officers will be elected at a meeting to be held October 15. President C. S. Drake's report showed that the membership now is 355 and the assets are \$9,000. The cash balance on October 1 was \$2,634.29, and in addition the club owns three acres of choice land purchased for a clubhouse site. Mr. Drake urged immediate action toward the erection of the building.

COLUMBUS CLUB BUSY ERECTING ROAD SIGNS

COLUMBUS, O., Oct. 11—A number of the members of the Columbus Automobile Club spent several days in erecting road signs on the highways to the west of Columbus. The signs are much larger than those used earlier in the year, most of which have been destroyed by vandals. The club expects to cover all the highways with both danger signs and road directions.

WESTERN NEW YORK CLUBS PLAN SHOWS

BINGHAMTON, N. Y., Oct. 11—The automobile clubs of Buffalo, Binghamton, Rochester and Syracuse are planning to arrange their shows next spring in a circuit, with dates following each other in such a way that one exhibit can make the entire circuit. Binghamton's date has been fixed for February 21 to 26. Buffalo is deciding between the fourth week of February and the second week in March. Syracuse has under consideration some week in March which will not conflict with the others, and Rochester agrees that if its show is a club affair it will carry out the same plan.

DELAWARE ASSOCIATION MEETING AND ELECTION

WILMINGTON, DEL., Oct. 11—The Delaware Automobile Association held its annual meeting here last week, and elected the following officers: President, J. Danforth Bush; vice-president, A. B. Hazzard; secretary, Charles G. Guyer; treasurer, William Stanier; executive committee, Joseph Bancroft, John B. Bird, Frank J. Cheney, Louis A. Drexler and William C. Corey. All are residents of Wilmington except Mr. Corey, who lives at Bethany Beach. The year book for 1910, which is being prepared by the association, will contain maps showing all the roads of the State and their condition.

WORKING FOR ROADS IN NORTHERN INDIANA

SOUTH BEND, IND., Oct. 11—At the recent meeting of the automobile club of this city in the Oliver, a movement was launched for the general improvement of the roads of the county. A committee was appointed to confer with the officials of Laporte County, where several hundred miles of macadam roads have been built, to find their cost and maintenance expense. M. L. Brummit, a member of the county council, was present and submitted a report on the proceedings of the good roads convention at Cleveland, to which he was a delegate.

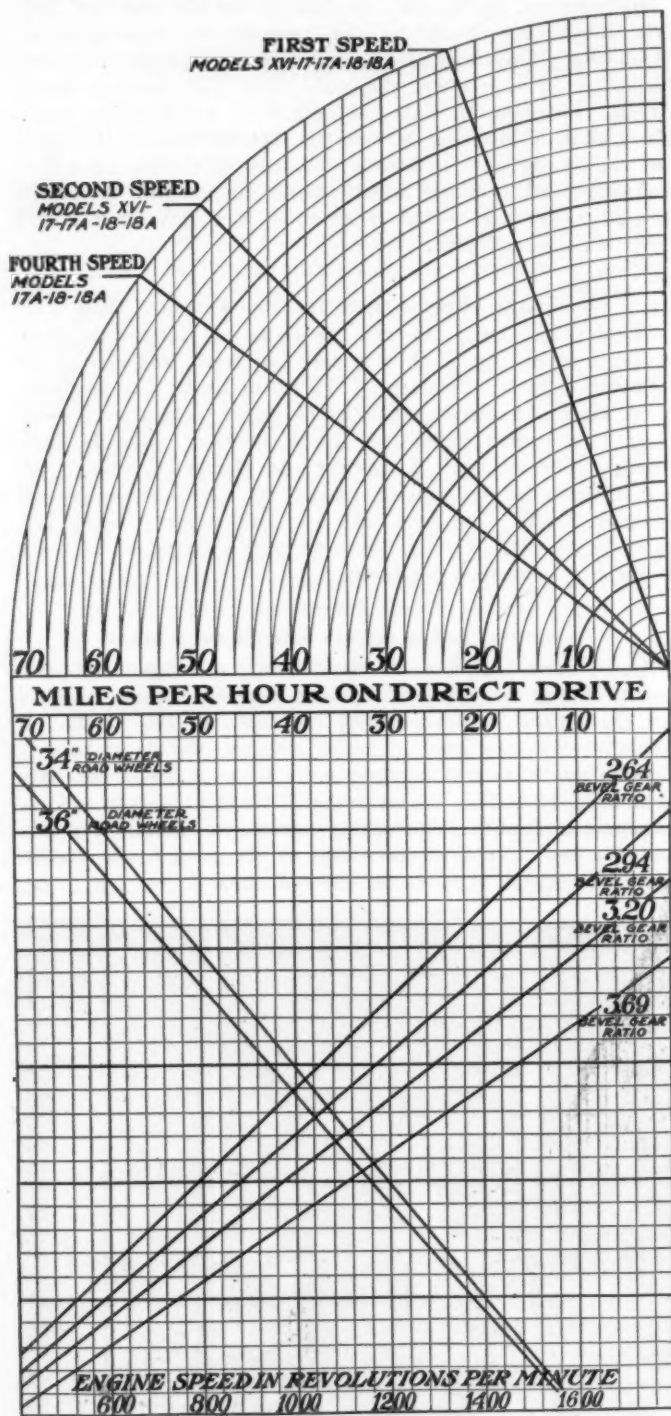


North Pole Controversy Gives A. M. C. M. A. Manager Reeves a Bright Idea

First honors in the decorated automobile parade in honor of the Hudson-Fulton celebration, at Yonkers, N. Y., were awarded to Masters Clifford and Robert Reeves, the children of Alfred Reeves, general manager of the American Motor Car Manufacturers' Association, who represented the rival Arctic explorers, Dr. Cook and Commander Peary. The float on the Maxwell car represented an Arctic scene, with the North Pole in full view, surmounted by an American flag, with Teddy bears climbing to the top. There were polar bear decorations, and icicles and snow galore. Mr. and Mrs. Reeves in black furs represented esquimaux, while the two youngsters in full snow-white Arctic costumes represented the North Pole explorers.

USEFUL AND SIMPLE SPEED CHART

"Very handy" describes the speed chart just issued by the Winton Motor Carriage Company, Cleveland. It consists of two parts: the lower and the upper. The lower is rectangular in shape and has six diagonals, four extending upward to the right, which are for the four Winton gear ratios. The other two diagonals extend upward to the left and are for 34-inch and 36-



Winton Speed Chart Takes Account of Wheel Sizes

inch wheels. The upper portion is devoted to the three indirect speeds, three diagonals intersecting a series of circles denoting the speed in miles per hour. To use, if the engine speed is known, start on the bottom horizontal at that speed, and proceed upward to the diagonal indicating the gear ratio. Then go across horizontally until the diagonal for the wheel size is reached. This last intersection is the start of the second vertical movement, which is continued until the miles per hour are ob-

tained. For the third, or direct, drive, this is read direct at the top line, but for the other indirect speeds the process varies. On first and second, follow around the arc to the diagonal, thence straight downward. On high or fourth speed, however, follow up on a straight line to the diagonal, thence back around the arc to the speed. Knowing any three of the four variables it is possible to find the other one by working backward.

Thus, if it is desired at any time to tell the speed of the engine, having a speedometer on the car, and knowing wheel size and gear reduction, proceed as follows: Start from the speed, then proceed upward to the speed diagonal in the reverse of the manner just described. Then a vertical will be obtained, which follow down to intersect the wheel diagonal. Then go across to cut the gear diagonal, and a perpendicular to the base line will give the desired speed of rotation of the engine.

This is a very handy chart to have, and all Winton owners will doubtless hasten to get and use one. It is to be regretted that the several diagonals on the lower part were not made more numerous, to allow of the use of the table by all automobile owners. Thus, if all gear ratios in even figures from 2.5 to 4 and all wheel diameters from 32 to 42 had been given, it would have been universal. The latter diagram, too, would have allowed a number of interesting deductions, as, for instance, the man with 34-inch wheels could read not only the speed at a given engine speed, but could figure out how much faster he would be traveling with the same engine speed if he but had 36, 38 and other larger-sized wheels; that is, this very handy and quickly used diagram would have been more handy and could be used just as quickly.

CAR'S AGE DIDN'T CHANGE MATTERS

BALTIMORE, Oct. 10—In the first case ever tried in this city for a loss sustained upon an automobile insurance policy a verdict was rendered in favor of the plaintiff, William P. Cummings, of this city, against the British and Foreign Marine Insurance Company, Limited, of Liverpool. Mr. Cummings purchased a Pope-Hartford machine of the make of 1907, which he had insured for \$1,500, paying a premium of \$60. The machine was subsequently destroyed by fire, when it was discovered to have been a 1906 car. The insurance company raised this point, saying that the defendant company would not have insured a 1906 car for the same amount. The case was tried before Judge Elliott and a jury in the Court of Common Pleas. The court refused all the contentions of the company and the jury rendered a verdict for the full amount of the policy, with interest to date, less the present value of the car as shown by the testimony. The total amount awarded Mr. Cummings was \$1,430.

AMATEUR WINNER OF MUNSEY HONORED

PHILADELPHIA, Oct. 11—At the Quaker City Motor Club last Saturday night, Gawthrop and Wister, local Elmore agents, presented a handsomely designed solid silver punch bowl to Frank Hardart, Jr., in recognition of his sterling work in capturing premier honors in the recent Munsey run from Washington to Boston and return. It will be recalled that Hardart's car finished that strenuous journey without a solitary road or technical penalty recorded against it—a most meritorious performance for car and driver, especially in view of the fact that Hardart is an amateur. Mayor Reyburn made the speech of presentation.

Gainesville, Fla.—The Cook Automobile Company has found it necessary to have its garage nearly doubled in size. An addition 50 by 60 feet will be built, extending the quarters to a length of 120 feet. The automobile fever seems to have struck the town and already 40 cars are owned by its residents, many of them having been purchased within the last four months.

FALSE IMPRESSIONS TEMPT INEXPERIENCED

By FRED W. HAINES, GENERAL MANAGER REGAL MOTOR CAR CO.

When reading the publications devoted to the automobile industry a person cannot help but wonder at the large number of new companies entering, or attempting to enter, the field. The desire on the part of men with money to get into the automobile business seems to amount almost to a craze, and it is now the easiest thing in the world to organize an automobile company and secure capital.

If people investing money in automobile manufacture had any idea of the troubles which have to be gone through and overcome before their business can be at all successful, if they had any conception of the many dangers to their investments, I really believe that they would be more careful in risking their capital than they apparently are.

The word "automobile" and the idea of manufacturing automobiles seems to have a magic sound to the ears of most people at the present time, and the abnormal increase in manufacture can only end in one way for the vast majority of these companies; and that way is failure.

It is a well-acknowledged fact among manufacturers, and it is now well known to most purchasers, that the first year's production of automobiles by any concern is bound to be inferior in a great many ways, and the purchaser now hesitates to buy a new production, no matter how well it may be backed by both experience and capital. There have been some exceptions to this rule, but it is so seldom that it is never noticed.

A new concern starting in, therefore, must have practically unlimited capital, and at the same time men with practical experience to guide the new company through its first year of life. In too many cases a company is promoted and its only asset is some supposed drawings made by a draftsman who has been employed by one of the older companies. In ninety-nine cases out of a hundred these drawings are not only incorrect, but incomplete, and from these drawings to the actual production of cars the way is very long and exceedingly hard.

The prospect of sales is very alluring, and it seems to be the easiest thing in the world to dispose of any old thing that may be manufactured. An automobile sale, however, is about the most unreliable kind of a sale, as it is subject to cancellation at any time before the money has actually been paid and the car delivered.

Another great trouble with the automobile business is the fact that almost every manufacturer overbuys on all his material, with the idea that if he does not actually need the parts he can cancel any part of the order at any time. The parts manufacturer, realizing this condition and the liability of a cancellation, in order to protect himself oversells on his production, so that he will not be able to produce anywhere near the number of parts he has contracted for.

Therefore, on account of the absolute unreliability of the contract made by both the automobile manufacturer and the parts maker, the entire production of cars depends upon the ability of the automobile manufacturer to secure a sufficient number of parts from the parts maker and to keep his entire stock of parts well balanced. A great many of the failures in automobile companies is caused by the seeming impossibility to secure needed material, and for 1910 this condition is going to be noticed more than ever. The enormous estimated production of cars for 1910 is about four hundred per cent. in advance of the actual production for 1909. The parts makers in 1909 were pushed to their fullest capacity, and the liberal estimate of an increase of fifty per cent. for the coming season will certainly account for all the increase that the parts manufacturers will actually be able to produce. It is, therefore, easy to see that the great majority of new automobile companies will find it practically impossible to secure any number of parts, and will wind up the coming season in a bad way financially.

This craze to get into the automobile business, to my mind, is brought about entirely by the successful manufacturers. The tendency to greatly overestimate their production, and also their

profits, when advertising, cannot be too strongly condemned, as it not only accounts for the desire of others to get into this apparently successful business, but it creates in the minds of the buying public an idea that practically fifty per cent. of the retail price of an automobile represents clear profit. This reason undoubtedly prevents a great many people from purchasing cars, as a man certainly would hesitate at paying an exorbitant price for any goods. It also creates a demand for cut prices from the retail dealer, as it is very hard for him to convince a prospective purchaser that he is working on a small margin of profit, and it is impossible for him to cut prices.

Every new company getting in the business, if it only builds a few cars, simply takes that much business away from the established concerns, and in the majority of cases the few cars that they do build fall down badly when sold, and in that way create an unfavorable impression of the automobile in general, not only with the purchaser of that particular car, but his friends also.

If the automobile manufacturers in their advertisements, and in all other ways, would stick exactly to the truth in regard to their production, and if they would be willing to show the public in general the immense amount of detail necessary to the production of a first-class machine, the high efficiency of the men required, and the absolute accuracy of all workmanship used, I think it would go a long way toward convincing the public in general that an automobile manufacturer's business is not entirely all profit, and is certainly not a bed of roses at any stage.

WHAT MUST BE PROVED TO PLACE GUILT

HARTFORD, CONN., Oct. 11—Mrs. Lucy R. Eldridge, wife of Commander Frank H. Eldridge, U. S. N., retired, has been bound over to the December term of the Superior Court on a charge of manslaughter, and is held under \$3,000 bond, which has been furnished. Mrs. Eldridge, while coming through West Hartford, September 29, in her automobile, struck and killed a seven-year-old boy. A chauffeur in the employ of the Columbia Motor Car Company, who was with Mrs. Eldridge in the car, testified that she did everything in her power to avoid the accident, and that he himself could have done no better. The car was running at 12 or 15 miles an hour. Mrs. Eldridge stopped immediately and tried to help the boy.

The case was tried before Justice Alexander J. Keeney, and Grand Juror Carl C. Thompson prosecuted for the State. Arthur L. Shipman, counsel for the defense, claimed that it was necessary to show negligence, criminal intent, wantonness or culpability before manslaughter could be proved, and denied that the prosecutor had shown any of these elements in the evidence introduced, which was chiefly that of a six-year-old boy. Nevertheless, Justice Keeney bound over the defendant. The case has attracted much attention because of the prominence of the parties involved, and it is generally held to be a rank instance of autophobia.

DENVER ENACTS TRAFFIC ORDINANCE

DENVER, COLO., Oct. 11—The Board of Aldermen of this city has enacted an ordinance establishing the right-of-way of vehicles at street intersections, which fills an important gap in the laws regulating traffic. This rule, which is section 1703 of Ordinance 124, reads as follows: "It shall be the duty of every person driving any vehicle, when approaching any intersecting street, alley or public way, to halt or slow up and allow any other vehicle approaching along the intersecting street on the right to have the right of way." Another section of this ordinance requires an overtaken vehicle to turn out to the right when signaled to do so by a vehicle approaching from behind.

The wording of the statute relative to slowing at crossings is somewhat ambiguous, since it is not made clear which vehicle would have the right of way, and which would have to wait, but as a whole, is expected to prove of much value.



Detroit American League Champions Trying Out New Rumber Model Fifty-Five

Baseball enthusiasts will be interested in this picture of the present opponents of the Pirates for the Championship, taken recently while in Boston. Aside from the famous Cobb, who will open a Southern agency for a Detroit car, Manager Jennings, seated right behind the driver in this picture, is also very much interested in automobiles. He was much pleased with the showing of the new Rumber in and about Boston, and expressed a wish at the time that he had more time to ride. It is reported that he will purchase a car upon the close of the present World's Championship series.

Shipping Autos by Express—When an automobile buyer wants his car bad enough to pay the difference between freight and express to get it a few days earlier, the company that made the car has good reason to pat itself on the back. The F. B. Stearns Company had such an experience recently, and the autos went by carloads all the way from Cleveland to Los Angeles. Coney C. Slaughter, the Stearns agent in the latter city, was responsible for the hurry-up order. After enduring the impatience of his clients as long as he could, he got the Stearns factory on the wire just as the cars were starting for the freight station. It cost \$1,000 to transfer the shipment to express, but Los Angeles doesn't care about that.

Mrs. Cuneo's New Records—Driving the Rainier which finished second in the Long Island Derby, Mrs. Joan Newton Cuneo made new records for the mile and five miles on a half-mile track in the races at Danbury, Conn. She drove the mile in 1:19, beating the previous mark by 12 seconds, and covered the five-mile in 7:19, cutting the former record by nearly a minute. The car in the case was the regular 45-horsepower stock chassis which is entered in the coming Brighton 24-hour race. The Rainier Company claims a record for the number of second places won this year in races by this stock model, usually competing with cars of much greater power.

Electrics for Dairy Use—Rapid transit is the primary requirement in the dairies which supply large cities with milk, and here as elsewhere the horse has been found too slow. The Fairfield Dairy Company, Montclair, N. J., recently received from the Baker Motor Vehicle Company, of Cleveland, a one-ton electric truck to be used for hauling milk cans to the railroad. This machine has a 92-inch wheelbase and 34-inch wheels

shod with 31-2-inch tires. Its power plant consists of a 42-cell 9 M. V. Exide battery and a 31-2-horsepower series-wound motor, capable of 300 per cent. overload. Its performance will be watched with interest.

Speed Limit for Locomobiles—The amended Indiana automobile law is entitled, according to the heavy type on the front page of the booklet, "An Act to Regulate the Speed, Operation and Registration of Locomobiles, Motor Cycles or Other Motor Vehicles Upon Public Highways." The Locomobile Company of America has called attention to this mistake, humorously suggesting that it may be due to the well known possibilities of the Locomobile in the way of speed. However, it hardly seems fair that the many law-abiding Locomobile drivers should have this formidable piece of legislation pointed so unmistakably in their direction.

American Simplex Meeting—About 25 stockholders, representing two-thirds of the stock of the Simplex Motor Car Company, were present at the annual meeting at the factory in Mishawaka, Ind. The following officers were elected: T. C. Starrett, of Detroit, president; R. E. Kamm and E. J. Gulick, of Mishawaka, vice-president and secretary and general manager respectively, and D. A. Shaw, of Detroit, treasurer. The directors include Messrs. Shaw and Gulick, H. M. Hovey and George Grant, of Detroit, and J. T. Knorr, of La Mars, Ia. Much elation was felt over the car's good showing in the Munsey run.

Activity in Moline Plant—The demand for Moline cars since the Glidden tour has forced the Moline Automobile Company to build a large addition to its plant in East Moline, Ill. At present a large four-story building is being rushed to completion, which will give an additional floor space of 60,000 square feet. This

will be used chiefly for chassis building and assembling. In the other departments of the factory there is also great activity, and each is working to the limit of its capacity to keep pace with orders which have already been received for the 1910 models.

Warner Gears Are Flourishing—In order to avoid attempting to move into a new factory at the height of the rush season, the Warner Mfg. Co. has concluded to remain in its present plant in Toledo, O., till spring, merely relieving congestion by renting additional space. This arrangement, however, is temporary only. T. W. Warner, president of the company, emphatically denies that it is connected with the Overland Automobile Company, but says that it is making steering and change-gears for 1910 Overland cars on contract.

Bergdoll to Make Cars—Louis J. Bergdoll, the Philadelphian driver of Benz cars, has organized a company to manufacture a \$1,500 car in touring, runabout and taxicab models. The first year's output will be about 150 machines. This will be the first automobile factory in Philadelphia, although that city furnishes many parts and accessories to the trade and contains many big manufacturing plants, insuring an abundance of skilled labor.

Graphite from Niagara—A building 50 by 105 feet is to be added to the Niagara Falls, Ont., plant of the International Acheson Graphite Company, Niagara Falls, N. Y. The building will contain a new grinding plant in which to prepare the various grades of graphite, for lubricating and other purposes, and also a shipping room and stock room for package goods, such as the graphite greases, powders, etc., made by the company.

Cameron May Move to Virginia—It is reported that the Cameron Car Company, of Beverly, Mass., contemplates establishing another plant for the manufacture of commercial cars in Norfolk, Va., in addition to its present factory. Inquiries have been made as to whether local magnates would consider raising a \$100,000 stock subscription on condition that the new factory employs 300 men.

Peru Gets Wheel Factory—Negotiations have been practically completed for the removal of the Salisbury Auto Wheel Company, at present of Jamestown, N. Y., to Peru, Ind. Peruvian capitalists have subscribed \$60,000 of the stock of the company, which is capitalized at \$200,000. It is said that 200 men will be employed.

Open for Alabama Agencies—The Snow-Tullis Hardware Company, 23-25 Commerce street, Montgomery, Ala., wishes to enter the automobile business. The company plans to sell both cars and a complete line of accessories, and will be pleased to receive propositions from manufacturers.

R. B. F. Bearings in America—The exclusive agency in this country for the R. B. F. ball bearings, made by the Société Française des Roulements à Billes has now been granted to the International Engineering Company, 1779 Broadway, New York City.

IN AND ABOUT THE AGENCIES

Stearns, Detroit—The F. B. Stearns Company will in the future be represented in this city by the Palmer Auto Company, of which Howard Palmer is the principal member. Headquarters

have been established at 1221-1229 Woodward avenue. The company will handle the Stearns exclusively.

Jackson, New York City.—The Jackson Motor Car Company, of New York, recently moved into its spacious new store at 1663 Broadway. The building was formerly occupied by the De Luxe representative, but has been considerably altered to suit the needs of the new occupant.

Miller Accessories, Atlanta, Ga.—Chas. E. Miller, the New York manufacturer and jobber of automobile supplies and accessories, has arranged to open a Southern branch in Atlanta on or about November 1, in time to supplement his exhibit at the show.

Elmore, Atlanta, Ga.—E. R. Clark has taken the agency for the Elmore, and has opened a show room in the northern half of the ground floor of the Masonic Temple, in the heart of the new automobile row. He is negotiating for a garage.

Standard, Haynes and Demot, Bainbridge, Ga.—The Caldwell Motor Car Company, of which C. H. Caldwell is manager, has contracted for the agencies for the Standard Six, the Haynes and the Demot in southwestern Georgia.

Chalmers-Detroit and Hudson, Nashville, Tenn.—Howard Cregor & Company, who hold the agency for the Chalmers-Detroit and Hudson, expect to open a salesroom at 135 Third avenue North this week.

Pullman and Baker, Houston, Tex.—The Imperial Motor Car Company expects to have its new salesroom at 1113 Prairie avenue open this week. It sells the Pullman and the Baker electric.

Fal-Car, Kansas City, Mo.—The Gunning Motor Car Company has taken the old quarters of the Tebeau Motor Car Company at 1716 Grand avenue and will act as agent for the Fal-Car.

Hupmobile, Davenport, Ia.—The Dillon Auto Company has established itself in Petersen's garage, Fifth and Main streets, and will handle the Hupmobile.

Great Western, Kramer, Ind.—The Great Western Automobile Company announces that it has arranged with Joseph Rice to handle its cars in Kramer, Ind.

PERSONAL TRADE MENTION

J. B. McIntosh, for the past three years Michigan agent for the Lambert Automobile Company, has been appointed general agent for Lambert cars over a larger territory. The retail department of the J. B. McIntosh Company will be in charge of M. L. Hagle, a well-known automobile man.

R. S. de Mitkiewicz, member of the A. S. M. E., who was formerly with the Fairbanks Company, is now associated with the New York office, 115 Broadway, of the Alden Sampson Mfg. Co., Pittsfield, Mass., as expert in mechanical transportation.

H. E. Grant has been appointed treasurer of the Motor Company, the Philadelphia representative of the Premier. Mr. Grant was formerly the Philadelphia manager of the banking firm of Newberger, Henderson & Loeb, and is well known in business circles.

R. E. Fulton, the Eastern wholesale distributor for the Croxton-Keeton Motor Company, sailed for Europe on the *Lusitania* to look over the foreign situation on a three weeks' trip.

M. C. Huie, who has sold Ford cars in Atlanta, Ga., for several years, has been retained to act as the manager of

the Ford Southern branch recently established in that city.

Harvey Goodwin has taken charge of the Stromberg Motor Devices Company, at 91 Church street. Mr. Goodwin was formerly with the Austin Automobile Company.

RECENT INCORPORATIONS

El Paso & Fort Hancock Railroad, El Paso, Tex.—Incorporated with a capital stock of \$100,000, by R. Capier, C. E. Kelley, W. Coolsey and others, of El Paso, Tex., to operate an automobile bus line between El Paso, Socorro and other towns in El Paso county.

American Aeroplane Company, Wilmington, N. C.—Incorporated with a capital of \$125,000, to manufacture aeroplanes; F. A. Bissinger, president; C. W. Polvogt, vice-president; David Palmgreen, secretary; C. H. Dock, treasurer.

Spencer Motor Company, Rahway, N. J.—Incorporated with a capital of \$125,000 by Charles G. Willis, of Brooklyn, N. Y., and Henry Albisser and A. G. Spencer, of Rahway, to manufacture automobiles and other vehicles.

Schroeder Aerial Navigation Company, New York City.—Incorporated with a capital of \$75,000 by Lindsey B. Newby, George E. Fleming and Will H. Crow, all of New York, to manufacture balloons, dirigibles and aeroplanes.

Berkshire Auto Car Company, Pittsfield, Mass.—Incorporated with a capital of \$120,000 by John McQuaid, Clement F. Coogan, and Hawkins, Ryan & Kellogg, all of Pittsfield, to do a general automobile business.

Brockton Rubber Tire Company, Brockton, Mass.—Incorporated with a capital of \$50,000 by Wallace C. Flagg, C. G. Nelson and McLeod & Sweet, all of Brockton, to manufacture and sell rubber tires.

The Pilot Motor Car Company, Richmond, Ind.—Incorporated by G. E. Seidel, C. H. Kramer and H. M. Kramer, with a capital of \$100,000, to manufacture automobiles.

TOLEDO OPENS GATES TO OVERLAND

TOLEDO, O., Oct. 11.—One hundred of the most prominent professional and business men gathered in the Toledo Club to do honor to the Overland Automobile Company, the Kinsey Mfg. Co. and the Warner Gear Company, who have recently established themselves in this city, on the occasion of the welcoming banquet last week. Each of the tables in the club's big banquet hall carried a cluster of dark red asters, and above the sideboard the name "Overland" was spelled out in pink carnations. The banquet was one of the most notable

social affairs of the nature ever given in this city. The menus bore on the front cover an open gate, behind which appeared the sky-line of the city, and the inscription: "Toledo—Open Wide the Gates." Speeches were made by J. N. Willys, president; W. H. Brown, vice-president; and F. A. Barker, sales manager of the Overland Automobile Company, and by Isaac Kinsey, president of the Kinsey Mfg. Co., and Thos. W. Warner, president of the Warner Gear Company, as well as by many prominent citizens of Toledo.

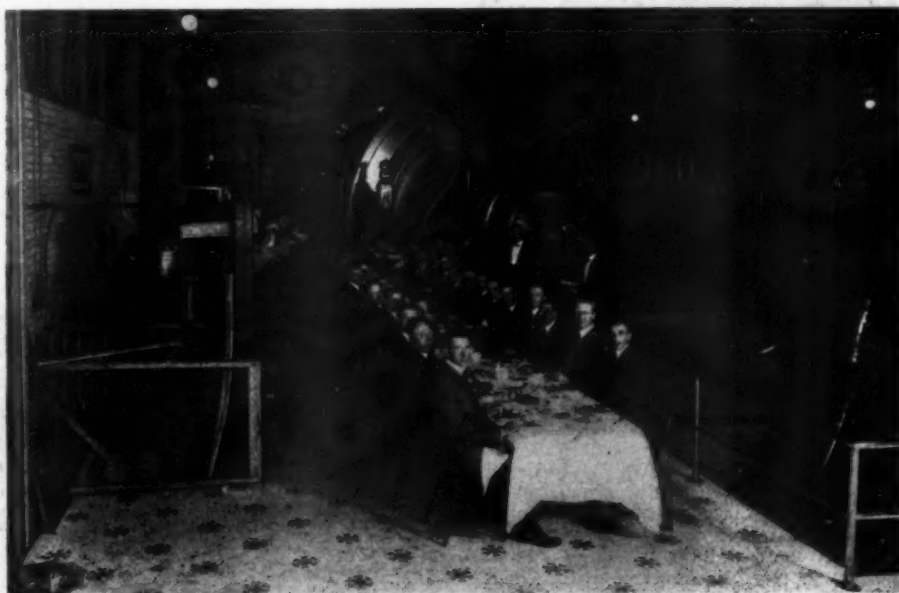
PACKARD PROGRESS CALLS FOR POWER

DETROIT, Oct. 11.—What is said to be the largest steam engine in the State of Michigan was turned on for the first time last Friday night at a power house banquet in this city, when President Joy officially opened the valve and threw on the switch which set the wheels of the Packard Motor Car Company's enlarged plant turning under the new power.

After the new engine had settled down to work, about thirty executives of the Packard company, the installing engineers and the Packard engineers sat down to a table spread in the engine room, discussed the new power plant, and swapped stories about the rapid growth of the Packard factory, which has necessitated a wonderful development of the power plant until to-day the three engines in service develop 5,000 horsepower. Another addition to the plant already has been started.

When the steam was turned into the new engine and the older one cut out, it was necessary for the untried monster to immediately take up the entire load. The engine is a Cooper compound of the Corliss type, direct-connected with a Western Electric generator. The bore of the low-pressure cylinder is six feet.

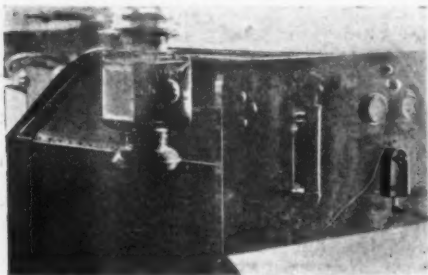
At the head of the table was President Joy and at his right and left General Manager S. D. Waldon and Manufacturing Manager C. J. Moore. The rest of the party comprised F. F. Van Tuyl, consulting engineer; F. C. Monroe, installing engineer; H. A. Hoagland, electrical installing engineer; Fred Willins, chief engineer of the Packard power plant; the assistant engineers and the executives of the Packard company.



Packard Executives Dining in Honor of Factory's New Power Plant

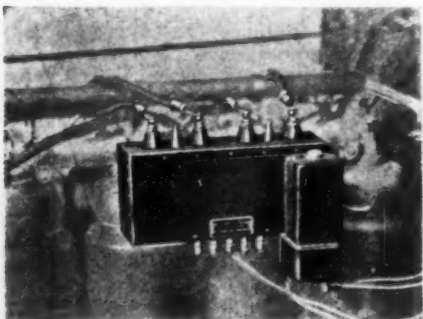
Information for Auto Users

Delco Ignition System—The Delco system of battery ignition is designed to provide a single spark for each charge of gas to be ignited, and thus avoid the waste of current that is inevitable in the usual vibrating-coil systems. The Delco



DELCO SWITCH ONLY PART ON DASH

system, which was brought out by the Dayton Engineering Laboratories Company, of Dayton, O., consists of four non-vibrating coils, a "controlling relay," which corresponds to what is commonly known as a master vibrator, and a special switch. The coils are built very compactly, and each unit is armored with a steel jacket, which protects it from water, oil and dirt. This enables them to be placed underneath the hood, close to the motor. The advantages of this location are numerous; the dash is left unobstructed, in compliance with modern



ARMORED COILS ARE UNDER THE HOOD

ideas as to the external appearance of the car, and wiring troubles are practically eliminated, because the wires may be made very short and direct. The circuit breaker, or "controlling relay," is also located under the hood, usually on the same bracket with the coils. This is the principal feature of the system, and its important points are covered by patents. It operates magnetically, and breaks the circuit the instant it is made by the timer, thus causing a single impulse of high-tension current from the coils and a single spark at the plugs. The switch is the only point of the system that is placed on the dash. It has the usual positions, battery, off and magneto—for a magneto may be used in the system instead of batteries, if desired.

The switch has a push button connected with the contact-breaker which enables the car to be started on the spark. Six dry cells are commonly used with the Delco system, and on these a car can usually be driven 2,000 miles. The current consumption at low speeds is only .04 to .05 ampere, rising to .3 ampere at sixty miles an hour; it averages at about one-third the usual figure for the vibrating-coil system.

Airless Resilient Automobile Tire—Since so large a proportion of the expense, delay and trouble in operating an automobile arises from tires, a vast amount of time, money and thought have been expended in the effort to perfect a satisfactory tire. The National Airless Company, of Indianapolis, believes it has solved the problem with the Airless tire. At any rate, the tires are reported to stand the test of resiliency and, under some long runs at an average of 40 miles per hour, with a car of 3,000 pounds, the thermometer applied to the tires showed heat ranging from 72 to 84 degrees—whereas 200 degrees is the danger point. One set has been run over 15,000 miles by the Chicago Towel Supply Company and the company has reports on others that have ranged up as high as 12,000 miles without trouble. So good has been the showing made that the U. S. mail wagons operated by the Overland company in Indianapolis are being equipped with them.

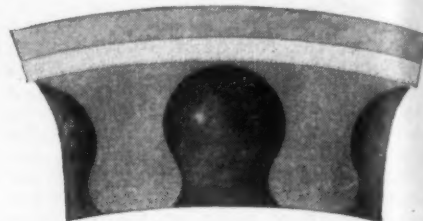
The construction of the tire is simple. The space occupied by the air tube in the pneumatic tire is occupied by globular cavities at close intervals, as shown in the second figure, which is a half-tone reproducing a photograph of a section of the tire sliced through the center. Each of these cavities has a circular outlet to the rim. This gives something of an umbrella shape to the solid rubber sup-



SOLID PART OF AIRLESS TIRE

ports distributing the strains in every direction on the cantilever principle.

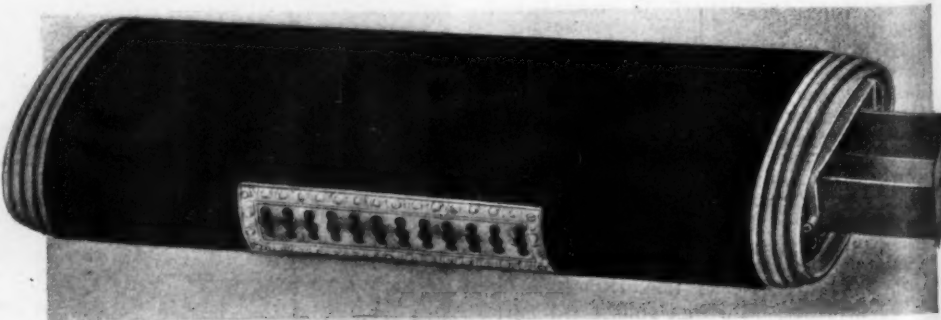
A glance at the first figure will show that the solid part of the inner construction does not reach the rim. A continuous air passage is left at the bottom of the tire, affording entire freedom of air circulation. After this inner part is molded, the tire is built up of layers of



INTERNAL TRUSSES GIVE STRENGTH

fabric and rubber just as are the best pneumatic tires, and it is all cured together, making one homogeneous whole. Thus there is entire absence of friction. The tire generates no more heat in running than does a pneumatic with either a reline or a tire protector.

Don't Get Cold Feet—For the man, woman or child bothered in winter or other cold weather driving, nothing makes such a hit as a foot warmer. Many of these are complicated, expensive, and costly to maintain. The new series of heaters just brought out by the Chicago Flexible Shaft Company, La Salle avenue and Ontario street, Chicago, under the names of Dutchess and Clark, do not possess any of these defects, in that they are simplicity personified, of medium price, and the cost to use is very low. These heaters are made in nine sizes, varying in price from the lowest, at \$1.25, up to the de luxe type, the Dutchess, at \$10. Each one of them is made so as to surround an inner compartment which is lined with or filled with asbestos to retain the heat as long as possible. The one end has a drawer which may be withdrawn at will and within which the fuel, as it is called, may be placed. This fuel is a very important part of the heater, although supplied separately. It comes in small, compressed cakes, and throws out an intense heat, without flame, smoke or odor, and moreover leaves very little residue. By wholesale buying, the price of the heat is reduced as low as two cents per ordinary drive and lower. Despite the remarkably low price for the heater, and equally low cost of operation, every heater and every brick of Clark coal is carefully inspected and the ensuing product guaranteed on a money back if not satisfied basis.



CLARK FOOT WARMER *de luxe*, "THE DUTCHESS," SHOWING FUEL PAN